Report to the Treasurer of Ontario on the Financing of Benefits Under the Superannuation Adjustment Benefits Act and Associated Superannuation Plans

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August 21, 1987

The Honourable Robert Nixon
Treasurer of Ontario
Queen's Park
Toronto, Ontario

Dear Mr. Nixon:

I have pleasure in presenting to you my Report on the Financing of Benefits under the Superannuation Adjustment Benefits Act and the Associated Superannuation Plans.

As directed by the terms of reference, I have reviewed the pension arrangements and in particular the inflation adjustment for Ontario teachers, public service employees and Ryerson employees. I have examined and made recommendations on a broad range of possible changes to the current system, including the following issues:

- whether the current adjustment formula should be changed for future service and if so what are the advantages and disadvantages of the various alternatives;

- whether the Superannuation Adjustment Funds should continue to be partially funded or whether full funding should be adopted, and if the latter what would be the appropriate amortization period or periods in respect of unfunded liabilities;

- whether it is appropriate to merge the superannuation funds and the adjustments funds with special reference to transfer requirements under the revised Pension Benefits Act;

- whether it is necessary to raise contribution rates for the current or an alternative adjustment formula and if so, how contribution rates should be set for plan members and the plan sponsors;

- whether the existing investment policy of SAF and the related basic plans is optimal and the impact of the current investment policy on plan funding.

WILLIAM M. MERCER
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Further, I have commented on the desirability of making the changes needed to put the inflation adjustments on a sound financial basis at the same time as the changes required by the recently revised Pension Benefits Act.

I am greatly indebted to Mr. Robert G. Buck, FCIA and his colleagues in Actuarial Services of Management Board for providing much information and making extensive actuarial calculations used in this report.

Yours sincerely,

Laurence E. Coward

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Fellow of the Canadian Institute of Actuaries

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INTRODUCTION

This report reviews and assesses the way in which escalated pension benefits are provided to the former members of the Teachers' Superannuation Plan, the Public Service Superannuation Plan and the Ryerson Superannuation Plan under the terms of the Superannuation Adjustment Benefits Act. The report recommends how the Superannuation Adjustment Benefits Act can be reorganized to overcome the various problems it now faces while still providing plan members with a reasonable and affordable level of inflation protection.

The Ryerson Superannuation Plan is not discussed separately in this report, but the recommendations made for the Public Service and Teachers' Plans apply to the Ryerson Plan in all essentials.

There is a wide range of potential solutions to the financing problems facing the three pension adjustment funds operating under the Superannuation Adjustment Benefits Act. Four principles have guided the analysis of the SABA financing problems, the evaluation of available solutions and the selection of the recommended solutions. They are:

(1) Public sector employees should not be financially advantaged, or disadvantaged relative to private sector employees by their participation in pension plans sponsored by Ontario;

(2) Public sector pension plans should be valued in a manner that identifies their full cost and relates it to the periods of service during which the pensions were earned;

(3) The cost of financing pension benefits should be apportioned fairly among the current and future generations of contributors and taxpayers;

(4) The full cost of public sector plans should be disclosed publicly for the information of plan members who contribute to and benefit from the plans, the government which is responsible for establishing public sector compensation and the taxpayer who provides the government's contributions to the plans and underwrites the promised benefits.

These four principles originate in the recommendations of the Royal Commission on the Status of Pension in Ontario and the Ontario Select Committee on Pensions.

This report has ten Parts. Part I reviews the history of SABA, describes its principal features, assesses the financial status of the three escalation funds created by SABA as well as the associated three basic funds and explains why the SABA funds and their associated basic funds must be reorganized.

Part II explains the interdependence between the cost of escalation benefits promised under SABA and the pension benefits provided by the three basic plans. This demonstrates the need for a comparable and consistent valuation of both benefits, which is best achieved by amalgamating each SABA fund with its associated basic fund.

Part III examines effectiveness and cost of various inflation protection formulae for future service. The alternatives range from maintaining the current high cost SABA formula to a lower cost excess interest formula related to pension fund investment returns. The question whether any new inflation protection formula should apply to benefits accrued in the past is also addressed.

Part IV reviews the current practice of investing TSF and PSSF monies in non-marketable provincial debentures and assesses the merits of beginning to invest in the private capital markets. Emphasis is placed on ensuring there is consistency among the investment policy pursued by the two plans, the interest rate used to value pension benefits and the inflation protection formula.

Part V examines the current actuarial assumptions used to value basic and escalation benefits to determine if they are consistent with the current investment policies and the guarantee of essentially full protection against inflation.

Part VI considers the interest rate appropriate for valuing pensions with guaranteed inflation protection. To do so it analyses the inter-relationship between investment policy, economic assumptions, inflation protection and the risks falling on employees and plan sponsors.

Part VII considers the way in which the members' contribution rates should be determined if the basic and SABA funds are amalgamated and full inflation protection provided. The interest rate assumption to be used in valuing the benefits of inactive employees should depend on the investment policy and philosophy of the government.

Part VIII suggests ways in which the consolidated basic and SABA plans could be soundly financed. It analyses the costs attributable to service prior to 1976 when SABA became effective, the cost for service prior to 1986, the cost under entry-age-normal funding and the cost under accrued benefit funding. The financial analysis in Part VIII uses current actuarial assumptions.

Part IX shows the costs to the government on the recommended actuarial assumptions, both before and after taking account of the amendments to the PSSF and TSF that will be required by the revised Pension Benefits Act. It also includes a discussion on four methods of amortizing the unfunded liability.

Finally, Part X points out the urgent need for action to amend the public service and teachers' pension systems because of the growing SABA liabilities. Changes required to put SABA in a sound position can best be made at the same time as changes required by the revised Pension Benefits Act.

Appendices contain technical material supporting the analysis in the body of the report.

EXECUTIVE SUMMARY AND RECOMMENDATIONS

The Superannuation Adjustment Benefits Act provides inflation protection for people entitled to benefits from the basic Public Service Superannuation Fund, Teachers' Superannuation Fund and Ryerson Superannuation Fund. The inflation adjustments are paid from separate Superannuation Adjustment Funds, not from the basic funds. The SAFs are financed on a modified pay-as-you-go method with the employees and the employer each contributing 1% of salary. When it was decided to index pensions of public servants and teachers in 1976, separate funds and pay-as-you-go financing were established in order to avoid the high immediate costs of a fully funded system. The Pension Benefits Act was amended to permit pay-as-you-go funding of escalated adjustments. The government is under an obligation to ensure that the Superannuation Adjustment Fund is not exhausted.

The unfunded liabilities that have arisen under SABA are large and growing. The establishment of separate adjustment funds with pay-as-you-go financing has resulted in non-disclosure of the cost of indexing and of the total liabilities for the employees' pensions. The valuations of the SAFs assuming an inflation rate of 4% per annum after 1993 reveal an unfunded liability of $2.6 billion in the PSSAF and $5.9 billion in the TSAF.

A reduction in the rate of inflation would reduce the liabilities of the SAFs but would increase the liabilities of the basic PSSF and TSF. Hence it is not correct to assume that if inflation declined to zero the liabilities of the SAFs would disappear. Instead they would be transferred to the basic plans. Amalgamation of the basic and adjustment plans would however cause the costs and liabilities of the combined plans to be almost independent of the rate of inflation.

The present arrangement means that the true liabilities for pensions of public servants and teachers are not disclosed to members of the plans or to taxpayers who support them. Further, since the contributions by and for present members of the SAFs are less than the value of their benefits from the SAFs, an ever increasing liability is being transferred to future generations.

Under the Pension Benefits Act, 1987, employees who leave the service have the right to require that the commuted value of their pension benefits be transferred to another employer or to an RRSP or used to purchase an annuity. Potentially the benefit outgo from the SAFs

could be greatly increased by transfers of commuted values, with the result that the funds will be depleted more rapidly than has been projected.

The current practice of maintaining separate SAFs with pay-as-you-go financing prevents the government, taxpayers and plan members from fairly assessing the value of the pensions promised to teachers and public servants. The recognition that basic and adjustment benefits are inseparable components of a single pension benefit and the valuation of the total pension benefit on a consistent basis is essential. It is recommended that the TSAF and PSSAF be amalgamated with their respective basic funds without delay to avoid further increases in the unfunded liabilities under SABA.

Indexation

At present pensions are automatically escalated by the full increase in the Consumer Price Index to a maximum of 8% and a minimum of 0%. If the CPI increase exceeds 8% or is negative the difference is carried forward and applied in a later year.

The present method provides practically full inflation protection. It is already in place and well accepted by employees and pensioners. The method is simple to understand and administer. On the other hand, the present indexing formula is expensive. Further, the pension fund cannot be insulated from the effects of varying inflation except by a policy of investing in short term fixed interest securities which have low returns.

An alternative is to increase pensions by the excess interest method. Pensions would be increased each year by a percentage equal to the rate of return on the pension fund's assets in excess of a base rate of, say 3%. The pension fund would be largely insulated against the financial effect of inflation on pensions, since pensions would only be increased to the extent that the investments earn a higher return. Unfortunately the indexing would not follow the rate of inflation closely and might be much greater or much less than increases in the Consumer Price Index. The only way to produce pension increases roughly matching the inflation rate would be to invest the fund in Treasury Bills or short term bonds, which would tend to reduce the investment return.

Other indexation methods would raise pensions by the increase in the CPI minus a fixed percentage (say 3%) or by a fixed percentage of the CPI increase (say 60%) or by a combination such as 75% of the CPI increase minus 1%. These methods would be less costly than the present SABA basis but would provide less than full inflation

protection. Under any of these options a decision would have to be made as to whether the formula applied retroactively. If the formula were made retroactive to pensions already earned employees might consider that there had been a breach of faith, whereas if the new formula applied only to pensions earned for service after the effective date it would be necessary to maintain records of pensions earned before and after the effective date and to apply different indexing to the two portions.

It is recommended that the present system of CPI indexing subject to a 8% cap be retained, provided the true cost is recognized and shared fairly between the employees and the employer. The excess interest method has not yet proven its long run practicality. It is an indirect way of protecting pensions against inflation, which does not track inflation in a satisfactory manner unless the fund is invested in short term bonds with low returns.

Investment Policy

The PSSF and TSF are invested in deposits or debentures with terms of 20 to 25 years. Historically the return on such investments has been poor if changes in capital values are allowed for. Investment of the cash flow in marketable securities would be expected to increase the rate of return of the fund. Such a policy would remove the criticism that the government obtains a subsidy through investing members' contributions at less than competitive rates and would improve the employees' understanding of investment realities. Investment in market securities also accords with the principle that public sector funds should operate as far as possible in the same way as private sector funds. Further, an investment fund would generate equity capital that should be of advantage to the Ontario and Canadian economies.

If the fund is to purchase market securities, the amounts to be invested would be large and care would have to be taken in the selection of investment managers and in the setting of investment policies. Measures might need to be taken to restrict the degree of control that the government could exercise over individual business enterprises through the public sector pension funds.

It is recommended that the net cash flow to the funds should be invested in marketable securities. Employee members of the PSSF and TSF should have minority representation on the investment committees responsible for directing the investment policy and selecting investment managers.

Economic Assumptions Used to Value the Basic and SABA benefits

The PSSF is valued by Actuarial Services of Management Board of Cabinet using streamed economic assumptions, in other words assumptions as to investment return, salary increases and inflation that vary for a number of years (until 1993). The economic assumptions after 1993 are that the real rate of return on new investments will be 2.0% net of inflation and that the real salary increases will be 0.5% plus promotion and seniority. The historical record for the last 25 years suggests that the real investment return should be no more than 1.5% on provincial bonds and that salaries should increase by a real 1.5% a year.

Hence the current assumptions probably understate the required contribution rate and the liability of the PSSF so long as the present investment policy continues. If, however, the investments were switched to a diversified and marketable portfolio of, say, 50% in common stocks and 50% in bonds, a real investment return of 3.0% might be expected.

The TSF is valued quite differently. It is difficult to see why such fundamentally different valuation methods and assumptions should be used for the PSSF and TSF which provide essentially the same benefits and have the same investment policy. The TSF valuation assumes a flat 7% investment return and salary inflation of 6% (nominal rates). The 1% gap between these rates appears to be too high for a fund invested in long term Ontario debentures, based on the historical record.

The TSF assets which had a book value of $7,584 million at the end of 1984 have been written up for purposes of the valuation to $12,005 million, by taking credit for expected future interest earnings in excess of 7%. Having regard to the investments currently held, the liabilities of the TSF as well as the PSSF are probably understated.

Valuing Pensions with Guaranteed Income Protection

Public servants and teachers are free of the risk that the purchasing power of their pensions will be impaired by inflation. An employer who wished to minimize the risk of deficit in a pension plan providing fully indexed pensions would invest the pensioners' reserves in T-bills or short term bonds, because these instruments most closely follow the rate of inflation, although the returns are relatively low. Over the last 25 years T-bills have produced an annualized real return of 1.9%.

Some private sector employers are unwilling to accept the inflation risk and would invest their pensioner reserves in T-bills or the like. Other private sector employers might invest more aggressively but

argue that the extra return should belong to the employer as a reward for risk taking. In these cases the value to an employee of a fully indexed pension should be calculated at a real interest rate of no more than 2%. This may be considered as the market value to the pensioner of a fully indexed pension.

Pension funds invested in a mixed portfolio (say 50% common stocks and 50% bonds) could expect to obtain a higher real return of about 3% in the long run. Most private pension funds are invested in diversified securities with annualized real returns of about 3%. If the employer were willing to share the rewards for risk taking involved in this investment policy with the pensioners, even though they do not share the investment risk, then the value of the fully indexed pension should be calculated at the higher rate of, say, 3%.

The principle of comparability with the private sector suggests that in valuing a fully-indexed pension plan a 3% real rate of return be assumed while the employee is active and a real rate of either 2% or 3% be used after employment ceases.

Contribution Rates and Valuation

The principle that the employees' contribution rate should cover 50% of the cost of benefits is well established. It is recommended that the employees' contribution rates should be 50% of the costs on an entry age normal basis assuming real interest rates of 3% prior to retirement or termination of employment and either 2% or 3% after retirement depending on how much risk or volatility the government is prepared to tolerate.

The assumed rate of growth of salaries should be 1.5% a year in real terms net of inflation, plus increases for promotion and seniority.

Recent amendments to the Pension Benefits Act require that the employer's contributions must provide at least 50% of the pension earned after December 31, 1987. This may require a slight modification of the matching contribution principle.

A number of actuarial methods are available for financing pension funds. In particular the government might assume the unfunded liability for all benefits arising from service before the new system comes into effect. This liability which arose from past operations when inflation rates were high and contribution rates low cannot fairly be charged to present employees; however, the cost of future service benefits should be shared 50/50 between employees and the government. Another method is for the government to assume the liability under SABA associated with pensions for service before 1976,

since employees did not contribute to SABA before that date. Other costs would be shared equally between the employees and the government. Under either of these two methods the employees' contribution rates would have to be substantially increased.

Accrued benefit funding, a method endorsed for accounting purposes by the Canadian Institute of Chartered Accountants, has been considered but rejected because of the relative instability of costs.

It is recommended that the entry age normal funding system be employed - a well-recognized system expected to produce costs that are a stable percentage of salaries.

Liquidation of Unfunded Liabilities

The Pension Benefits Act requires unfunded liabilities (other than experience deficiencies) to be liquidated by equal annual payments over not more than 15 years. A longer amortization period might be appropriate for the public service and teachers' superannuation plans, in view of the full indexation and the strength of the plan sponsor, but a longer period of say 25 years would require legislation.

Draft regulations under the Pension Benefits Act would allow unfunded liabilities to be liquidated by payments for 15 years of a fixed percentage of the salaries of employees who were plan members when the unfunded liability arose. This method produces a series of payments that differ only slightly from the standard 15-year amortization.

It is recommended that unfunded liabilities determined from an entry age normal valuation should be paid off over a 15-year period or if legislation is changed over a 25-year period.

Timing of Amendments

Changes to amalgamate the PSSF and TSF with the corresponding SAFs and to reorganize the funding should be made with a minimum of delay. The position of the SAFs is deteriorating and action is urgently required to remedy the situation.

Furthermore, the PSSF and TSF will have to be amended to comply with the revised Pension Benefits Act, 1987. It is desirable to combine the amendments required by the Pension Benefits Act with those required to put SABA on a sound basis. In particular, a single increase in the employees' contribution rates would be much more acceptable than two separate increases.

Recommendations

(1) The basic benefits under PSSF, TSF and RSF and the escalation benefits under SABA should be recognized and valued as a single benefit.

(2) The TSAF, PSSAF and RSAF benefits should be funded using the same actuarial funding methods as their respective basic plans.

(3) The TSAF, PSSAF and RSAF should be amalgamated with their respective basic funds to ensure that there is consistent valuation and presentation of their assets and liabilities.

(4) The amalgamation of the basic plans and SABA should take place without delay to avoid further increases in liabilities under SABA.

(5) Inflation protection should continue to be provided by increasing pensions in proportion to increases in the Consumer Price Index.

(6) The present 8% ceiling on annual pension increases, together with the carry forward, is reasonable and should be retained.

(7) Pensions should not be reduced if the Consumer Price Index falls.

(8) The net cash flow to the PSSF and TSF funds, that is the excess of the contribution income plus investment return plus maturities of the present investments over the outgo for benefits, should be invested in marketable securities in the same manner as the cash flow of a private sector pension plan.

(9) The fund manager should not be restricted by legislation in carrying out his or her responsibilities, except by the provisions of the Pension Benefits Act.

(10) In selecting investments the fund manager should not be required by the government to consider the social aspects of investment or the potential advantages to the Ontario economy, nor should the manager be prohibited from doing so.

(11) Employees who are members of the plans should have minority representation on the investment committees responsible for directing the investment policy, including the selection of fund managers, brokers, investment counsel, measurement services and the like.

(12) Any investment policies relating to social investments or investments to improve the Ontario economy should require the approval of a majority of members of the investment committee including all employee committee members.

(13) The PSSF and TSF should be valued by the same actuarial method and using the same actuarial assumptions except where probable differences in demographic or economic conditions can be demonstrated.

(14) If the present investment policy is unchanged the PSSF and TSF valuations should use streamed economic assumptions with ultimate real rates of interest of 1-1/2% per annum and real salary increases of 1-1/2% per annum adjusted for promotion and seniority.

(15) If the investment policy is changed to allow the purchase of market securities, the ultimate real interest rate assumption should be raised to 3% per annum.

(16) The contribution rates for members should be one-half of the full and true cost for a new entrant of the combined basic and SAF benefits, as near as it can be found, recognizing that the government will have to provide something extra for employees who benefit from the 50% cost-sharing rule in the revised Pension Benefits Act.

(17) Members' contribution rates should be based on the expected return on future market investments, not the existing investments.

(18) In determining members' contribution rates, the economic assumptions in the pre-retirement period should be:

Real investment return	3% per annum
Real salary increases	1-1/2% per annum plus promotion and seniority
Inflation rate	4-1/2% per annum

(19) In determining members' contribution rates, the economic assumptions in the post-retirement period should depend on the investment policy and philosophy of the government.

(a) If the government's policy is to minimize its risks by investing pensioners' reserves in short term fixed interest securities or to base the contribution rates on the economic value of fully indexed pensions, a real interest rate of 2% per annum should be used.

(b) If the government is prepared to absorb the risks of variability in market investments a real interest rate of 3% per annum should be used.

(20) The post-retirement interest rate assumption should apply to the benefits of pensioners, terminated employees and survivors. It should apply to the pensions of active employees from the point at which they retire or terminate from the service.

(21) Members' contribution rates once determined for the combined basic and SAF funds should not be changed unless the benefits are increased or fundamental economic or demographic changes have occurred.

(22) After the members' contribution rate has been realistically established, the employer should pay the balance of cost as determined by actuarial valuations, being obliged to amortize any deficit and being entitled to benefit from any surplus.

(23) The existing surplus in the PSSF and TSF should be carried forward and used to offset the unfunded liabilities of the PSSAF and TSAF when the basic and adjustment funds are combined.

(24) The entry age normal valuation method should be employed in valuing the PSSF and TSF after they have been combined with the corresponding SAFs.

(25) Streamed interest rate and salary rate assumptions should be used for a few years after the valuation date to take account of known facts. The ultimate real rate of return should be 3% (or 3% before retirement and 2% after retirement if the government is risk-averse); and the ultimate real salary increases should be 1.5% plus seniority and promotion.

(26) The unfunded liability existing at the first valuation of the amalgamated basic and SABA funds should be liquidated by equal annual payments over 15 or 25 years.

(27) Any gains or losses arising in the periodical actuarial valuations should be used to decrease or increase the government's contributions during the next five years after the valuation date.

(28) Action should be taken with a minimum of delay to phase out the SAFs and to put the funding on a sound basis.

(29) The amendments to the PSSF, TSF and RSF recommended in this report should be made at the same time as amendments required to comply with the Pension Benefits Act, 1987.

PART I OVERVIEW OF SABA AND THE NEED FOR REORGANIZATION

This part of the report provides an overview of the Superannuation Adjustment Benefits Act including the historical background and an assessment of the financial status of the three funds established under the authority of SABA.

1. The Origin of SABA

The 1975 Superannuation Adjustment Benefits Act was introduced to provide regular inflation protection for the retired and deferred members of the pension plans covered by the Act. The regular escalation payments paid under SABA replaced the previous system of ad hoc updates financed through the Consolidated Revenue Fund, which were intended to compensate Ontario teachers and civil servants for the effects of rising inflation. Inflation in 1975 was running at 9.5% a year and during the preceding four years inflation had increased from 4.9% in 1971 to 12.3% in 1974.

On June 12, 1974, Premier Davis announced the then government's desire to develop a program of regular annual adjustments to pensions under the Public Service and Teachers' Superannuation Funds with the costs being shared equally by employer and employee. After extensive consultation with representatives of the affected plans, the Act was passed in 1975. The design and financing of the inflation protection formula followed closely the recommendations of an internal government Task Force on Pension Escalation which had completed its report on March 1, 1974.

2. Principal Benefit and Financing Features of SABA

The Superannuation Adjustment Benefits Act applies to those pension plans designated by regulation, which currently are the Public Service Superannuation Plan, the Teachers' Superannuation Plan and the Ryerson Pension Plan. The principal features of the Act are as follows:

- Pensions are automatically escalated by the full increase in the Consumer Price Index to a maximum of 8.0% a year and a minimum of 0.0%. If the CPI increase exceeds 8.0% or is negative, the difference is carried forward and applied in a later year.

- The automatic indexing applies to deferred pensions both before and after they commence to be paid.

- Escalation benefits are financed on a modified pay-as-you-go basis with members contributing 1.0% of salary to one of the three Superannuation Adjustment Funds established by SABA. Employers contribute an equal amount to the respective Funds.

- The cost of indexing pensions commencing before 1976 is charged to the Consolidated Revenue Fund.

- Separate Review Committees were established to monitor the financial status of each of the three SABA funds.

The matching of member and employer contributions under SABA carries out the intention that the cost of inflation protection is to be shared equally between members and employers. However, the government assumed responsibility for the cost of financing inflation protection for those members who retired prior to 1976. Equal sharing of pension costs is a generally accepted principle in the public sector. It was also recommended by the Task Force on Pension Escalation whose report preceded the government's announcement that it would introduce inflation protection and the Committee for Consultation on Pension Escalation whose work led to the actual passage of SABA in 1975.

3. Reason for Modified Pay-As-You-Go Financing and Separate SABA Funds

As will be seen later in this report, the current problems faced by SABA originate with the 1975 decision to finance escalation payments on a modified pay-as-you-go basis through separate funds instead of fully funding the benefits through the already existing basic plans. A review of background documents prepared by the Task Force on Benefit Escalation and government representatives on the Consultative Committee on Benefit Escalation make it clear that the avoidance of high immediate costs was the principal motive for selecting partial funding.

Table 1 summarizes the dollar and relative costs of the full and partial funding alternatives considered in 1974. In the first year of operation, it was estimated that full funding of escalation benefits for both the TSF and PSSF would have cost $150.8 million including amortization of unfunded liabilities. By contrast, the combined dollar value of member and employer contributions at 1% of salary each was estimated to be only $40.2 million.

TABLE 1

ESTIMATED COST OF FULL AND PARTIAL FUNDING
OF ESCALATION BENEFITS FOR TSF AND PSSF, 1975
($ millions)

	Full Funding(1)			Partial Funding(2)		
	PSSF	TSF	TOTAL	PSSF	TSF	TOTAL
Current Service	27.8	51.3	79.1	17.5	22.7	40.2
Amortize Unfunded Liability over 15 years	22.1	49.6	71.7	-	-	-
Total	49.9	100.9	150.8	17.5	22.7	40.2
Percent of Budgetary Revenue 1975-76	0.55%	1.12%	1.66%	0.19%	0.25%	0.45%

(1) Future service cost was estimated to be 3.1% and 4.5% for the PSSF and TSF, respectively.

(2) Combined member and employer contribution of 1.0% each.

Expressed in relative terms, the cost of full funding was equal to 1.66% of Ontario's 1975-76 budgetary revenue of $9,010 million while partial funding was equal to only 0.45%. Based upon this relative relationship, the 1974 cost estimates translate into 1986 dollar amounts of $640 million and $172 million, respectively.

It was recognized in 1975 that the contribution rates under the partial funding alternative would inevitably have to increase if projected levels of inflation were realized. With the proviso that there would be no SAF contribution rate increases during the first six years of operation, the issue of when and by how much future

contribution rates should increase was left to the future experience of the SAF funds. Review committees comprised of government and member representatives were established to monitor the ongoing and projected experience of the funds.

In addition to concerns about cost, the addition of partial funding and separate funds was undoubtedly influenced by the introduction of similar inflation protection arrangements for federal civil servants by the Government of Canada in 1973.

4. Pension Benefits Act Amended to Allow Partial Funding and the Establishment of Separate SAF Accounts

Prior to 1975, the Pension Benefits Act required all promised pension payments to be fully funded, including escalation payments. However, in order to permit partial funding by the government of the proposed SABA benefit, this feature of the Pension Benefits Act was amended to allow escalation payments to be partially funded rather than fully funded. This amendment applies to private as well as public sector pension plans.

Because normal funding requirements no longer applied to escalation payments, the Pension Commission required employers wishing to partially fund inflation protection to identify costs on a separate accounting basis. For the purposes of the SABA, this meant the establishment of separate escalation funds for the Teachers' Superannuation Plan, the Public Service Superannuation Plan and the Ryerson Pension Plan and the pay-as-you-go accounting of costs.

5. Government Commitment to SABA Escalation Payments.

An important issue is the nature of the government's commitment under SABA. The Acting Deputy Attorney General expressed the opinion on August 12, 1986 that the government has an obligation to ensure that the Superannuation Adjustment Fund is not exhausted. Thus the government's liability is not limited to the amount of the funds held by the three SAF accounts. If those on whom the duty rests fail to maintain the fund, the Assistant Deputy Attorney General advised, a superannuated civil servant would have a cause of action against the Crown. If the Court found in favour of the superannuated civil servant and there were no money in the fund, the shortfall would have to be provided from the Consolidated Revenue Fund.

It is noted that those entitled under SABA are "recipients". Recipients are persons in receipt of pensions, or are entitled to deferred pensions. Hence an active employee has no rights under SABA until he or she retires or terminates employment with a vested pension.

6. Comparison with Private Sector Pension Practices

The current SABA arrangement provides full contractual indexing when inflation is at or below 8.0% a year. Unless inflation exceeds 8.0% for extended periods, the carry-forward provision ensures SABA participants of essentially full protection against changes in the CPI. While Ontario public sector employees, other than members of the PSSF, TSF and Ryerson SF, do not enjoy full contractual inflation protection, public sector employees in some other Canadian jurisdictions do, most notably federal government employees.

Because of uncertainty about costs, it is exceptional to find full contractual indexation in the private sector. While Statistics Canada data indicate there are 220 private sector plans that provide full inflation protection, the vast majority of these plans are significant shareholder plans usually with only 1 to 5 members. The inclusion of inflation protection in these plans is motivated by the desire to maximize tax sheltering of pension savings for individual plan members by full funding future escalation payments, rather than to provide inflation protection for a general membership.

While some private sector plans provide inflation protection through the use of excess interest formulae, the majority provide inflation protection (if any) by declaring ad hoc updates. The ad hoc increases commonly have regard for the excess interest or other sources of surplus. The timing and magnitude of these updates depend on a variety of factors including the funded status of the plan and the financial stability of the plan sponsor. It is generally accepted that sponsors of large pension plans have provided ad hoc updates at 40% - 50% of changes in the Consumer Price Index. It is very rare for ad hoc increases to be granted terminated plan members with deferred pensions.

Those private sector pension plans that do provide contractual indexation are typically large, capital intensive, well established and profitable. Shell Canada is the best known private sector plan that provides full contractual inflation protection. However, in contrast to SABA, Shell fully funds its indexed benefits. Private sector plans rarely if ever provide contractual indexing on other than a fully funded basis. Pay-as-you-go financing of contractual commitments as allowed under the Pension Benefits Act is generally considered inappropriate by private plan sponsors.

7. Growing Liabilities in the SABA Funds

The unfunded liability in the SABA funds is very substantial and growing. Moreover, in 1987 the benefits paid out will for the first time exceed the contribution income of the PSSAF and the same will happen by 1991 in the TSAF. The funds will continue to grow for some years after these dates as a result of interest earnings, but will ultimately decline and be exhausted. The need for a reversal of this deteriorating situation is evident unless the government is prepared to watch the unfunded liability of SAF grow without control.

8. Equal treatment for public and private pension plans

The Ontario Government in the past has followed the enlightened policy of applying to its public sector pension plans the same rules as those applying to private pension plans under the Pension Benefits Act. When the Ontario Pension Benefits Act came into force in 1965, being the first legislation of its type, it was considered that the Act would be better accepted if the government set an example by amending its own pension plans to conform. This discipline is considered desirable in the interests of the employees and as a matter of sound finance. Further, it demonstrates to the public that the government is sincere in seeking equality of treatment between its own employees and employees in the private sector. Pay-as-you-go funding is not permitted for pension funds under the Pension Benefits Act, except for escalated adjustments. The exception was made specifically to accommodate the SAF and is little used by the private sector.

9. Intergenerational equity

A major advantage of full funding of pension obligations is that the cost is allocated to the years in which it was incurred. The total compensation of an employee consists of wages or salary, plus various group insurance and fringe benefits, plus an increment of pension benefit. These items should properly be charged to the year in which service is performed by the employee, so that the true costs of operation may be known, assessed and budgetted for year by year.

By contrast pay-as-you-go financing, or partial funding as employed in the SABA, defers a large part of the cost to future years. In consequence current members or taxpayers are charged less than the value of the accruing benefits.

Ultimately the accumulated deferred costs will have to be met, together with interest thereon, unless the total payroll of the pension plan members increases indefinitely at a sufficiently high rate. Thus pay-as-you-go funding means that each generation passes an increasing liability on to succeeding generations.

10. Proposed portability requirements

Ontario's Bill 170, an Act to revise the Pension Benefits Act, received Royal Assent on June 29, 1987. This Act expands the portability rights of employees, that is the right to require the commuted value of a pension benefit to be transferred to the pension fund of another employer or to the employee's RRSP or used to purchase an annuity. An employer is required to allow an employee to withdraw and transfer the commuted value of his or her pension and ancillary benefits to another fund if the employee terminates employment before retirement with a vested pension. However the employer is not required to transfer the commuted value if the employee qualifies for a retirement pension.

The commuted value of a PSSF or TSF benefit must include both the basic and the SAF benefit. Potentially the benefit outgo from SAF could be greatly increased by transfers of commuted values. The indications are that employees will find the portability option attractive, as they expect to earn a higher investment return on the transferred funds than the rate of interest used in calculating the transfer values. As a result of transfers the SABA funds will deplete more rapidly than currently projected. Hence the need to revise the finances of SABA will be greatly increased by the passage of the pension reform legislation.

The portability rules were designed so that an individual could amalgamate several small pensions from different employers into one pension and be independent of past employers. While the accelerated depletion of the SAFs could be avoided by exempting the PSSF and TSF from the proposed portability rules, this would be a departure from the principle of equal treatment of public and private employees. Moreover allowing portability for the basic benefits but not for the SAF benefits would probably be impracticable, because the commencement date and type of basic pension would be unknown.

The manner in which commuted values are to be calculated will be prescribed by regulation. The Canadian Institute of Actuaries has made recommendations as to the basis for calculation of commuted values.

11. Full disclosure of real SABA costs

As shown in the next section of this report, the pay-as-you-go funding of SAF makes it difficult to make fair comparisons of compensation in the public and private sectors. This difficulty feeds the public suspicion that employees of government and its agencies have advantages that are not available generally and that they enjoy hidden benefits and perquisites. Funding of SABA benefits on conventional lines would be consistent with policies of full disclosure and open government.

PART II AMALGAMATION OF BASIC AND SABA FUNDS

1. Comparable Valuations of Basic and SABA Funds Required

The public service and teacher pension arrangements are unique in Ontario because level pensions are provided from the "basic" plans and post-retirement increases to keep pace with inflation are provided from separate Superannuation Adjustment Funds. The basic plans are funded by conventional actuarial methods, whereas the SAFs are financed on a modified pay-as-you-go system. An exemption from the usual funding requirements under the Pension Benefits Act was made to accommodate the SAFs. A very few private sector pension plans use this exemption for their indexing provisions (which are usually subject to a low ceiling) but none of them have separate funds.

The exemption in the Pension Benefits Act for "escalated adjustments" was made at a time of crisis for pension funds. High inflation was causing deficits to arise in many pension funds since liabilities increased with the earnings of employees while at the same time asset values declined because of bond and equity depreciation. At the same time employers were under pressure to provide inflation protection, which the government wished to encourage. Such crisis conditions no longer exist.

The separation of the basic and adjustment funds has resulted in non-disclosure of the cost of the indexing and of the total liabilities for the employees' pensions. The relatively small surpluses shown in the valuations of the basic plans are disclosed, whereas the much larger deficits in the adjustment plans are kept confidential. As a result the combined plans are perceived to be in sounder condition than they really are.

For illustrative purposes let us examine the positions of the PSSF and PSSAF. The same principles apply to the TSF and TSAF.

2. Separate SABA Funds Mask Fundamental Relationship Between the Cost of Basic and Escalation Benefits

Chart 1 portrays the complementary and inextricable relationship which exists between the cost of basic benefits under the PSSF and the cost of escalating these benefits. The near horizontal upper line indicates that the total liability for benefits under the PSSF and PSSAF remains essentially unchanged at about $9.5 billion over moderate levels of inflation. This stability is possible because the inflation premium contained in a pension plan's investment earnings is

sufficient to finance benefit escalation without imposing additional costs. The calculation is based on the membership and benefits of the plans as at December 31, 1985.

This illustrates that, in principle, an indexed pension plan in an inflationary environment is no more expensive than an unindexed pension plan in a zero inflation environment. Indeed the latter is slightly more expensive, because pensions are based on the final 5 years average earnings, not earnings at the point of retirement, which means that the real value of pensions is reduced by inflation.

However, as indicated by the downward sloping line, the distribution of the total liability of the basic and escalated components will change with inflation. At higher levels of inflation, a larger proportion of the $9.5 billion liability arises from the escalation payments. For example, at 4.5% inflation the liability of the basic PSSF is only $5,903 million. However the decline in the cost of the PSSF benefit is offset by a $3,532 million liability, which is the present value of all the 4.5% escalation payments from PSSAF to present employees.

The complimentary and offsetting relationship between the cost of PSSF and PSSAF benefits portrayed in Chart 1 is masked by Ontario's current practice of having separate funds and different financing arrangements for the PSSF and PSSAF. This leads easily to the incorrect conclusion that the value of basic and supplementary benefits can be assessed independently. In turn, this results in misunderstandings by the government, taxpayers and plan members about the cost and value of pension benefits promised Ontario teachers and public servants.

The following section presents numerical examples illustrating the complementary and offsetting relationship between the cost of basic and escalation benefits under different longrun levels of inflation.

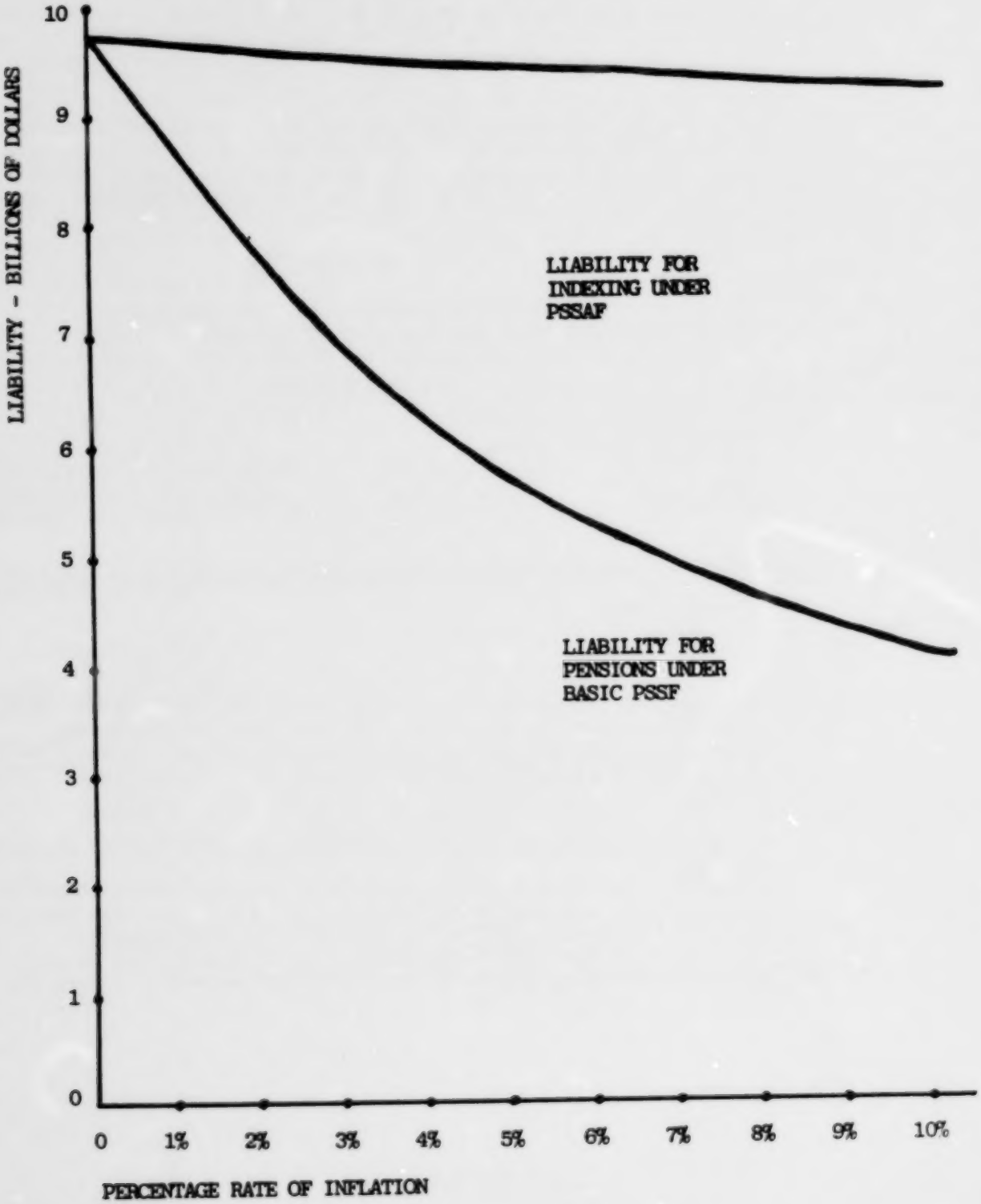
3. Pay-As-You-Go financing Means SABA Liabilities Unrecognized

Table 2 presents three different representations of the assets and liabilities of the PSSF and PSSAF assuming inflation at 5.5% a year. The first set of figures illustrates how the assets and liabilities are currently presented. The estimated assets and liabilities of the funded PSSF are $6,023 million and $5,435 million, respectively. The $588 million surplus is the amount by which the PSSF assets exceed the liabilities. Because the PSSAF is pay-as-you-go financed and not fully funded, its assets are recorded simply as the dollar value of contributions accumulated with interest less benefits paid. No estimated liabilities are presented because this is not required under pay-as-you-go financing.

CHART 1

Total liabilities of Public Service Superannuation Fund and Public Service Superannuation Adjustment Fund at various rates of inflation.

Valuation assumptions and membership as at December 31, 1985.



However, if the assets and liabilities of the PSSAF were estimated using the same actuarial method and assumptions as used for the PSSF, comparable measures would be obtained. As indicated by the second set of figures in Table 2, the PSSAF has assets of $877 million, liabilities of $3,940 million and an unfunded liability of $3,063 million.

The consolidated presentation of assets and liabilities is the result of merging the PSSF and PSSAF and treating them as one plan. The consolidated PSSF and PSSAF assets and liabilities are $6,900 million and $9,375 million, respectively. The consolidated unfunded liability is $2,475 million.

TABLE 2

ALTERNATIVE PRESENTATIONS OF PSSF AND PSSAF
LIABILITIES AND ASSETS AS AT DECEMBER 31, 1985
(level interest assumptions - millions of dollars)
5-1/2% Inflation

	Current Non-comparable Presentation		Comparable Presentation		Consolidated Presentation
	PSSF	PSSAF	PSSF	PSSAF	PSSF+PSSAF
Assets	6023	421	6023	877	6900
Liabilities	5435	--	5435	3940	9375
Unfunded liability (surplus)	(588)	--	(588)	3063	2475

By presenting the assets and liabilities of the PSF and PSSAF in a comparable manner the existence of a very large and previously unrecognized unfunded liability is revealed. The $588 million surplus in the PSSF is converted into an unfunded liability four times as large.

4. SABA's Liabilities Will be Transferred to Basic Plan as Inflation Declines

A common misunderstanding that originates from the establishment of separate basic and escalation funds is the expectation that the $3,063 million of unfunded liability in the PSSAF would disappear if inflation were zero because escalation payments would not be paid. This expectation is incorrect. As inflation decreases to zero the

PSSAF liability for escalation does not disappear; it is transferred to the basic PSSF.

Table 3 contains the same information as Table 2 except that the inflation rate has been assumed to be 4.5% a year in Section A and 3.5% a year in Section B. It is assumed that there will be no change in the real interest rate and real salary growth, net of inflation. In other words a 1% decline in the inflation rate will cause a corresponding 1% drop in the nominal rate of return on the pension fund and a 1% decline in the nominal rate of salary increase.

Under the current non-comparable method of presenting the financial position of the funds, the lower inflation rates have practically no impact on the portrayal of the PSSAF. However, the liabilities of the PSSF rise dramatically from $5,435 at 5.5% inflation to $5,903 at 4.5% inflation and to $6,449 at 3.5% inflation. The current noncomparable presentation shows the powerful effect of inflation on the cost of the unindexed PSSF benefits, but conceals the effect of inflation on the cost of indexing through PSSAF.

TABLE 3

ALTERNATIVE PRESENTATIONS OF PSSF AND PSSAF
LIABILITIES AND ASSETS AS AT DECEMBER 31, 1985
(level interest assumptions - millions of dollars)

	Current Non-Comparable		Comparable Presentation		Consolidated Presentation
	PSSF	PSSAF	PSSF	PSSAF	PSSF & PSSAF
Section A - 4-1/2% Inflation					
Assets	6016	421	6016	876	6892
Liabilities	5903	--	5903	3532	9435
Unfunded liability (surplus)	(113)	--	(113)	2656	2543
Section B - 3-1/2% Inflation					
Assets	6008	421	6008	875	6883
Liabilities	6449	--	6449	3075	9524
Unfunded Liability (surplus)	441	--	441	2200	2641

Under comparable valuations, the PSSAF liabilities would fall from $3,940 million at 5.5% inflation to $3,532 million at 4.5% inflation and to $3,075 million at 3.5% inflation. The important point is that

as the rate of inflation declines the liability of the basic PSSF greatly increases and the liability of the PSSAF greatly decreases.

The consolidated liability of PSSF and PSSAF combined is comparatively stable but increases slowly as inflation declines; it would be about $9,800 million if inflation fell to zero. The reason why the consolidated liability rises as inflation falls is that pensions are based on the last 5 years average salary; thus pensions at retirement date are greater in real value if inflation has been zero than if inflation has been say 5% a year.

The transfer of the PSSAF liability to the PSSF is another manifestation of the principle that a fully indexed pension plan in an inflationary environment is no more expensive than an unindexed pension plan in a zero inflation environment.

The inflation assumption, which is far more speculative than the assumptions as to real investment return and real salary increases, has a powerful effect on the valuations of the basic and adjustment funds, but it would have little effect if the funds were combined. Thus the finances of the combined funds would be more stable and predictable.

The basic and supplementary plans are two sides of the same coin. They are interdependent and the employee receives only one pension cheque with constant purchasing power. The fundamental weakness in methods which maintain the SABA funds as separate entities to be funded without direct reference to the basic plans is that a change in the rate of inflation will affect the basic and adjustment funds in different directions.

5. Intergenerational Equity

The present method of financing the SAFs raises serious questions of intergenerational equity.

Advance funding of pension plans has two main purposes - benefit security and fiscal responsibility. Funding enhances the security of the benefit rights of plan members. In the absence of funding the employees are completely dependent on the employer's ability and willingness to fulfill the pension promise. The security of the benefit promise is not as serious a question in public as in private funds, although a fund for a public sector plan may be perceived as providing some protection against cutbacks in a time of financial crisis.

The second main purpose of funding is to ensure fiscal responsibility by the plan sponsor. Funding ensures that the costs are properly

charged to the years during which they were incurred and that the employer must face up to the full cost of the promised benefits.

Pay-as-you-go financing, or inadequate and arbitrary funding as under SABA, means that the true liabilities are not disclosed to the members or to the taxpayers who help to support the plan. There has in fact been no public disclosure of the full liabilities of the SAF. As a result there tends to be an unrealistic perception of the value of the SABA benefits and of the cost of maintaining these in force in the future.

Under pay-as-you-go or near pay-as-you-go liabilities are transferred from one generation to the next. This is unfair to future generations, because it is obvious that the less that is paid initially into a pension plan the more must be paid later on. Not only must the accruing cost be paid later, but also the investment income that would have been earned had proper contributions been paid into a fund. In theory there is no advantage to an employer in delaying pension contributions unless the interest rate earned by the fund is less than the time value of money to the employer. For employees, delaying pension contributions means transferring them from those who retire in the early decades to those who retire later. In practice, both employers and employees are tempted to "buy now and pay later".

The Pension Benefits Act rightly prohibits pay-as-you-go, terminal funding or other inadequate funding systems because of these dangers and because of the possible burden that would be placed on the Pension Benefits Guarantee Fund. As mentioned in Part I an exemption from the normal funding rule was provided in the Act in order that SABA might be established in what were considered to be special circumstances.

The SABA benefits are being provided on a near pay-as-you-go basis. The benefits are rising rapidly having doubled in the last three years. The benefit outgo is estimated to exceed the contribution income in 1987 for public servants and 1991 for teachers. Interest income will help to support the benefits for some years after that, but the PSSAF is expected to become negative in 2001 and the TSAF in 2008. These dates are based on projections made by Actuarial Services of Management Board, assuming no increase in the present 1% contribution rates.

If the contributions to the SAFs are not increased until the funds are exhausted the matched contribution rate would then jump from 1% of salary to about 2.6% for public servants and to about 4.4% for teachers. This would not be the end of the story, for the projections

indicate that in the year 2019 contributions would be required at the rate of about 4.3% for public servants and 6.9% for teachers. Hence very large contribution increases would be required at the time when the rate of anticipated inflation might be much less than it is today. If this were so the government might find it impossible to get the employees, as a group, to pay half the cost of the indexation.

Fortunately these difficulties and the unfair transfers of cost to future generations can be avoided. The problems of intergenerational transfers will largely disappear if, as we recommend, the basic PSSF and TSF are combined with the respective SAFs and properly funded.

6. Summary and Recommendations

The current practice of pay-as-you-go financing SABA benefits and maintaining separate SABA funds prohibits the government, taxpayers and plan members from fairly assessing the value of pension promised Ontario's teachers and public servants. Current practices also foster misunderstandings of the fundamental relationships betweer the cost of the basic benefits and escalation benefits.

Further, the pay-as-you-go financing is transferring liabilities for the present generation of employees and pensioners to future generations, in a manner that will produce arbitrary and unfair results.

The recognition that basic and escalation benefits are inseparable components of a single pension benefit and the implementation of procedures that provide consistent valuation of the total pension benefit are essential. This ensures that current public sector employees are not advantaged and future employees are not disadvantaged by their participation in pension plans of the Government of Ontario. It also ensures that the employer's share of the cost of indexation is apportioned fairly between current and future taxpayers.

To overcome these problems, it is recommended that:

(1) The basic benefits under PSSF, TSF and RSF and the escalation benefits under SABA should be recognized and valued as a single benefit;

(2) The TSAF, PSSAF and RSAF benefits should be funded using the same actuarial funding methods as their respective basic plans;

(3) The TSAF, PSSAF and RSAF should be amalgamated with their respective basic funds to ensure that there is consistent valuation and presentation of their assets and liabilities; and

(4) The amalgamation of the basic plans and SABA should take place without delay to avoid further increases in liabilities under SABA.

PART III ANALYSIS OF VARIOUS METHODS OF PROVIDING INFLATION PROTECTION

1. Excess Interest Indexing - Guide Rate and Base Rate

The principle behind excess interest indexing is that inflationary gains in pension fund earnings should be used to offset inflationary losses in the purchasing power of pensions. The method is expected to produce for the employee a pension reasonably related to the cost of living and for the employer stable and predictable costs.

Excess interest indexing requires a portfolio of investments that will produce a Guide Rate of interest and a decision on a Base Rate of interest. The percentage increase in pensions to compensate for inflation each year is the Guide Rate minus the Base Rate.

The portfolio of investments used to determine the Guide Rate may be the actual investments of the pension fund, or a portion of the fund's investments (for example the fixed interest securities). It could even be a hypothetical fund designed to simulate the investment performance of typical private sector pension funds. The Guide Rate may be the return on the fund based on market value, or may be the return taking the assets at book values and ignoring capital gains and losses. However the book values of common stocks (unless written up systematically) are unsuitable for this purpose because capital gains are an important part of the return on equities and very volatile.

The Base Rate is ideally meant to be real return expected to be earned on the portfolio net of inflation. Thus assuming that inflation is fully reflected in the Guide Rate, pension increases equal to the difference between the Guide Rate and the Base Rate will compensate in full for the pensioner's loss of purchasing power.

2. Relationship of Base Rate to the Investment Policy

The Base Rate should depend on the composition of the assets. In a portfolio of minimum variance, such as Treasury Bills, a Base Rate between 1% and 2% would probably be considered appropriate in the light of historical economic statistics. Federal bonds of various terms have produced average annualized real returns net of inflation as shown below (for comparison the provincial bond average is also shown).

	91 Days	1-3 Years	3-5 Years	5-10 Years	Over 10 years	Provincial Bonds
15 years 1971-85	1.75%	0.75%	0.54%	0.37%	0.16%	1.38%
25 years 1961-85	1.93%	1.41%	1.40%	1.11%	0.68%	1.28%

It will be seen that the real returns are quite low; surprisingly they are lower on the long term federal bonds than on short term bonds and 91 day Treasury Bills. The provincial bond averages shown above are somewhat better than long term federal bonds; Ontario issues are probably between the two.

Annualized real returns for other securities are:

	Common Stocks	Long Bonds	Mortgages
15 years 1971-1985	4.03%	0.16%	3.87%
25 years 1961-1985	5.04%	0.68%	3.08%

A Base Rate of about 3% might be suitable for a balanced portfolio of stocks, bonds and mortgages such as those surveyed by SEI Funds Evaluation Services. A Base Rate of 4%-5% is indicated for a pure common stock fund, being the average real return over the last 15 to 25 years, but the averages over shorter periods are very variable.

The Ontario Royal Commission estimated that the future return on a riskless security such as a federal government bond should be 2-1/2%. The figures quoted above suggest that this is an overestimate.

Although these Base Rates have been derived in the light of economic statistics over many years, the statistics are far from regular. Marked variations occur from year to year which are reduced but not eliminated by taking averages over 5 years, 10 years or more. In recent years there have been massive swings in the year to year return on bonds. In the last 15 years the average nominal return on the common stock index was 12.30% with a standard deviation of 18.91%; on Canada long bonds the return was 8.12% with a standard deviation of 12.61%.

3. Modifications of Excess Interest Indexing

When excess interest indexing was first introduced some funds adopted the valuation rate of interest, say 6% or 7%, as the Base Rate. This meant that the valuation of the plan was not affected by the indexing, but at the same time, full compensation for cost of living increases was not expected. Other modifications are often found.

The Guide Rate is usually smoothed by some mechanism, for instance by taking the last four years average (arithmetic mean) of the fund's earnings, since most business cycles last for about four years. Commonly the pension increases each year are limited to the Consumer Price Index increases, but with a carry-forward provision if the calculated increase exceeded the Consumer Price Index increase. Reductions in pension are usually ruled out.

The investment returns on the PSSF, TSF and SAF as now constituted are not suitable for use in excess interest indexing, whether the returns are calculated on the book value of the assets or on the market values. In the former case, since the terms of the investments are long, the investment return (average interest rate) would change only slowly and would not be responsive to inflation. In the latter case the investment return would be the interest yield plus the change in market value determined by discounting the cash flow of the deposits or debentures at current interest rates. Changing rates of inflation and interest would cause large changes in these values, especially those of longer terms. In brief, the average term of the deposits and debentures in these Ontario funds is too long for them to be suitable for measuring inflation.

4. Excess Interest Indexing Uncommon in Private Sector

Excess interest indexing is little used in the private sector, except in the sense that the amounts and timing of ad hoc increases may be influenced by the pension fund's earnings and more generally by the financial position of the fund. The merits of indexing by an excess interest formula have not been adequately tested in the marketplace. The employers that have adopted this system, including several Ontario universities, differ greatly in the methods they use. No generally accepted method of applying the excess interest principle has yet emerged.

The reasons employers are reluctant to adopt excess interest indexing are as follows:

1. Employers are unwilling to have their hands tied either by legislation on inflation protection or by an automatic provision in the pension plans.

2. Employers consider that excess interest indexing is not "free", resulting from windfall increases in the value of the fund, but costly since they have only contracted to pay the cost (or balance of cost if the employees contribute) of level benefits. Excess return on investments may be the result either of inflation or of a successful investment policy. Employers who invest heavily in equities believe they are entitled to the extra return as a reward for the extra risk they have taken.

3. The flexibility of ad hoc indexing allows the employer to grant pension increases where he thinks they are most needed - for example larger increases in smaller pensions, or more to those who have been retired longest.

4. Excess interest does not match the rate of inflation. The more the excess interest formula is modified to achieve a better match, the greater it departs from the excess interest principle.

5. Employers may get more credit from announcing an ad hoc increase every year or two than in adopting an indexing formula once and for all.

6. Employers do not wish to grant increases if there are gains from excess interest but at the same time losses in the fund from other sources, such as mortality, disability, retirement ages and termination rates - or if the employer's business is in trouble.

Let us now consider the advantages and disadvantages of the available methods of providing inflation protection.

5. Excess Interest Indexing - Advantages and Disadvantages

Excess interest indexing has been described in Sections 1 - 4 of this Part. Pensions are usually increased by the excess of a Guide Rate of Interest, related to that earned by the pension fund, over a specified Base Rate of Interest.

Advantages

- The pension fund is largely insulated against the financial effect of inflation on pensions.
- Pensions are increased only to the extent that the investments have earned a higher return relative to the Base Rate and hence there need be no cap on the size of pension increases.
- Costs of the plan are not increased by unanticipated increases in the inflation rate.
- Employees can readily understand the principle.

Disadvantages

- The indexing will not follow the rate of inflation closely and may be greater or less than CPI increases.
- Pension increases will be very variable even if a smoothing mechanism is introduced to reduce volatility.
- The only way to produce pension increases approximately equal to the inflation rate is to invest the fund in Treasury bills or short term bonds; such investments tend to reduce the return on the fund.
- The choice of the Base Rate will be controversial and the subject of lobbying by employees; it ought to be consistent with the assumptions used in calculating the contribution rates.

6. Present SABA Formula - CPI Indexing with 8% Cap

The present SABA formula adjusts pensions at the beginning of each year by the ratio that the average Consumer Price Index for 12 months ending on the previous September 30th bears to the corresponding average a year earlier, adjusted as follows. The pension increase shall not be greater than 8% for any year but any excess shall be carried forward to subsequent years; the increase shall not be negative but any decrease in the CPI would be similarly carried forward. Further the adjustment on January 1 for those who retire during the previous year is pro rated to allow for the number of full months on pension.

Advantages of retaining present indexing formula

- it is already in place and well accepted by active, deferred and retired employees;
- it fully compensates for the loss of purchasing power up to 8% per annum, and any loss if the CPI increase exceeds 8% is likely to be temporary because of the carry forward feature;
- the method is simple to understand and to administer;
- inflation is measured by a well-recognized index, the Consumer Price Index, which is not under the control of the Government of Ontario;
- no change would be required to continue the present system and therefore no retroactivity problems would occur;
- if a new indexing formula were introduced, pensions would have to be divided into the portion earned before and after the effective date of the amended formula.

Disadvantages:

- it is an expensive inflation protection measure;
- full inflation protection is not given if inflation continues above 8% for a long period;
- the carry forward provision restores the purchasing power eventually, but does not make up the loss for the years when the 8% limit applied;
- the CPI may not be the best index of price of items in a pensioner's budget (although the Royal Commission recommended its use);

- the pension fund cannot be insulated from the effects of varying inflation except by investment in short term fixed interest securities which have low yields.

7. Indexation to the Consumer Price Index Increases Minus a Fixed Percentage (say 3%)

As at present, a maximum annual rate of increase with a carry forward provision would probably be necessary. Reductions in pension would not take place even if the CPI increase were less than 3%.

Advantages

- This method would be less costly than the present SABA basis since the loss of purchasing power of pensions would be shared between the employee and the pension fund.
- This method is not designed to compensate for low rates of inflation on the principle that there should be a "deductible" insurance feature to limit the cost.
- Normally pensioners can bear a reduction of 3% a year in their income from the Ontario pension plans, since benefits from the Canada Pension Plan and Old Age Security are fully indexed to increases in the CPI.

Disadvantages

- Full inflation protection is not provided. At 3% per annum a pension loses over 1/4 of its purchasing power in 10 years, 1/3 in 15 years and 1/2 in 23 years.
- At rates of inflation below 3% no increases in pension would be granted.
- Consideration would have to be given to retroactivity - that is whether the new formula applies to all pensions from the date of change, or to pensions of all who retire after the date of change, including terminations with deferred vested pensions, or whether it should apply only to pensions earned for service after the date of change.
- Employees would probably object.

8. Indexation at a Fixed Percentage of the Increase in Consumer Price Index (say 60%)

As at present, a maximum annual rate of increase with a carry forward provision, would probably be necessary. Reductions in pension would not take place if the CPI declined.

Advantages

- This method would be less costly than present SABA basis.
- The method would be simple to understand and administer.
- The total income of pensioners, including benefits from the Canada Pension Plan and Old Age Security, will have a high degree of inflation protection.

- As pensioners' needs tend to decline with age (except for health expenditures), and benefits from the Canada Pension Plan and Old Age Security are fully indexed, pensioners can bear some reduction in indexing their employment pensions.

Disadvantages
- Full inflation protection is not provided.
- Consideration would have to be given to retroactivity.
- Employees would probably object.

9. Indexation at 75% of the Consumer Price Index Increase Minus 1%

This formula is applied in a different context in the federal Pension Benefits Standards Act. Under that Act employers have the option of paying 50% of the cost of every vested pension; or of indexing deferred pensions, in the period between the employee's termination and retirement date, at the rate of 75% of the CPI increase minus 1%. The formula borrows from health and general insurance the idea of "deductible" and "co-insurance", although it is questionable if these concepts are appropriate to pension indexing.

There is no maximum on the annual pension increase under the PBSA formula, but a maximum should be considered if the formula were adopted for the SAFs.

Advantages
- This method would be less costly than the present SABA basis.
- This formula provides better inflation protection in comparison with "CPI minus 3%" if inflation is less than 8% and worse protection at higher inflation rates.
- As pensioners' needs tend to decline with age (except for health expenditures) and benefits from the Canada Pension Plan and Old Age Security are fully indexed, pensioners can bear some reduction in indexing of their employment pensions.

Disadvantages
- The formula is arbitrary.
- The formula is more complicated and difficult to rationalize.
- There may be more trivial increases than under another formula.
- Consideration would have to be given to retroactivity.
- Employees would probably object.

Table 4 compares the level of inflation protection provided under the four formulae described in sections 6 to 9.

TABLE 4
COMPARISON OF INDEXING OPTIONS

Inflation Rate %	Present SABA	CPI Minus 3%	75% CPI Minus 1%	60% CPI %
1	1	0	0.00	0.6
2	2	0	0.50	1.2
3	3	0	1.25	1.8
4	4	1	2.00	2.4
5	5	2	2.75	3.0
6	6	3	3.50	3.6
7	7	4	4.25	4.2
8	8	5	5.00	4.8
9	8	6	5.75	5.4
10	8	7	6.50	6.0
11	8	8	7.25	6.6
12	8	8	8.00	7.2

10. Conclusion and Recommendations

In conclusion the present system of CPI indexing subject to an 8% cap has much to commend it, provided the true cost is recognized and shared between the employers and employees. The excess interest method has not yet proven its longrun practicality; it aims to provide inflation protection indirectly and only succeeds if the fund is invested in low-yield short bonds.

A cap on the annual increases is needed to guard against the possibility of runaway inflation, at which time the government would undoubtedly intervene but should not have its hands tied. An 8% cap is reasonable because since 1924 the CPI increase has only exceeded 8% in the years 1947, 1948, 1951 and 1973-82. As noted, all pensions have been restored to their original purchasing power as a result of the carry-forward mechanism.

Recommendations

(5) Inflation protection should continue to be provided by increasing pensions in proportion to increases in the Consumer Price Index.

(6) The present 8% ceiling on annual pension increases, together with the carry forward, is reasonable and should be retained.

(7) Pensions should not be reduced if the Consumer Price Index falls.

PART IV INVESTMENT POLICY

In this section we examine whether the investments of the Public Service Superannuation Fund and the Teachers Superannuation Fund should be changed to those permitted for private pension funds. A possible alternative is that the rates of interest credited to these funds by the government should equal what market investments would produce.

1. Present Investments of PSSF, TSF and SABA Funds

The assets of the TSF are invested under the Act in Ontario debentures with terms of 20 to 25 years, bearing interest at a rate based on the secondary market for Ontario securities of the same term. The assets of the PSSF are invested in 25 year deposits with the province at an interest rate determined by the Lieutenant Governor in Council. The same applies to the investments of the Superannuation Adjustment Funds although the terms of the deposits may range from 1 to 20 years.

In effect, the new money generated each year in TSF and PSSF is being invested for approximately 25 years at an interest rate 1/8% over the rate on new long term Ontario issues in the year. The SAFs are similarly treated but with shorter terms as recommended by the review committees. Prior to 1984 the Teachers' Fund was credited with the same interest rates as the Public Service Fund but with a one year time lag. After 1983 the two funds were put on the same basis with respect to the investment of future cash flow.

The advantages and disadvantages of switching to market investments are as follows.

2. Advantages of market investments

(a) accord with private sector:

Investing the PSSF and TSF in market securities accords with the principle that public sector funds should operate in the same way as private sector funds. Market investment is required by the Pension Benefits Act and the Income Tax Act for private sector funds. Although the reserves held for the Canada Pension Plan and some other governmental plans in Canada are non-marketable (and book reserves are allowed even for private pension plans in Germany), the practice in the private sector suggests a fund of marketable securities.

(b) removes a source of criticism:
Over the years there have been repeated suggestions that the PSSF and TSF should be used to buy stocks, bonds and other securities as do other funds, including OMERS, HOOPP and the Ontario Hydro plan. The government would then be subject to the "discipline of the marketplace" and could no longer rely on easy borrowing from the public sector funds. More important, it would remove the suspicion that the government obtains a subsidy through investing the members' contributions at less than competitive rates.

Many teachers and public servants believe that the contribution rates they pay are higher in relation to the benefits than are necessary. Whether this is true or not, investment of the pension funds in market securities is essential to improve the employees' understanding of investment realities. It appears that the only way to satisfy the employees that the fund is being properly managed is to invest in the market - and to appoint employee representatives to the committees that choose the fund managers and direct the investment policy.

(c) increased rate of return:
An invested fund can be expected to increase the rate of investment return. Over the 25 years 1961 to 1985 the annualized real return (net of inflation) on federal long bonds was 0.68%, and on ten provincial bonds 1.28%. The returns on the PSSF and TSF, which are related to the yields on Ontario long bonds, would be between these figures, in the neighbourhood of 1% per annum. Over the same 25 year period the real return on common stocks was 5.04% and on conventional mortgages 3.08%. While these annualized returns conceal great variations in year to year returns, they show that a mixed portfolio is expected to outperform a fund invested only in longterm Ontario government debt.

The potential higher return of a mixed portfolio would enable the PSSF and TSF contribution rates to be reduced, other things being equal. However, the PSSF and TSF have generated large deficits in the past which have required extra contributions from the government; hence the main effect of higher earnings might be to reduce the deficit payments of the government, should the fund again run into deficit positions.

(d) facilitates excess interest indexing:
A benchmark fund would be needed if the excess interest method of indexing were to be adopted. Obviously a fund of marketable securities would serve the purpose and would enable the employer to avoid unanticipated costs in times of high inflation. However the Guide Rate needed for excess interest indexing in the PSSF and TSF can as easily be based on the return of the hypothetical portfolio; if this were also the rate of the interest credited to the PSSF and TSF, the funds would be insulated against losses. The new arrangements under the federal Public Service Superannuation Act are an example of this technique.

(e) generates capital:
An invested fund would generate capital that should assist in the development of the Ontario economy. The extent to which the economy benefits depends on the investment policy that is followed - not much would be achieved if non-marketable Ontario bonds were merely replaced with marketable ones. The pension fund manager would presumably follow the pattern set by private sector pension funds and invest in a mix of bonds, stocks, mortgages, real estate and short term securities. In the absence of restraints or social criteria imposed by the government, the manager's duty would be to maximize the earnings of the fund, having regard to security of capital. The larger market for Ontario and Canadian equities should be of advantage to both the provincial and national economies. Further, the plan members might feel a greater sense of security and fair play with a real fund supported by the earnings of corporations than with a paper fund supported by taxes.

3. Disadvantages of market investments

(a) size of funds a problem:
The size of the funds to be invested creates a problem in itself. At the end of 1984 the PSSF, TSF and SABA had assets of more than $12 billion and unfunded liabilities of $7 billion. To put this in perspective, the federal Department of Finance estimates that the total market value of the equity of companies included in the TSE 300 Index at the end of 1984 was $146 billion, of which $58 billion was in controlling blocks, leaving a float of $88 billion available to investors. Of this amount of available equities, trusteed pension funds held $24 billion or 27%. Even if only the new money from the PSSF, TSF and SABA (that is the contributions plus interest plus debenture maturities minus the outgo for benefits and expenses) were invested, the impact on the stock and bond markets could be significant. The new money generated in 1985 by the PSSF was $480 million and by TSF $1231 million.

(b) conflicts in investment policy:
Care would have to be taken in the selection of investment managers and brokers and in the setting of investment policies. The government might be under pressure with respect to the fund's investment objectives, that is to maximize the fund earnings and at the same time to maximize assistance to the provincial economy. These two desirable objectives may give rise to conflict. Difficult questions might arise as to the use of social criteria, avoidance of certain investment categories (tobacco, alcohol, South Africa), and disposal of investments held in Ontario firms that got into financial trouble.

(c) government control of business:
Whatever agency were responsible for investment policy would soon have a significant measure of control over many businesses. At present the 30% limit on the shares of a company that could be owned by a pension fund, under the Pension Benefits Act, applies to the investments of PSSF and TSF. The same limit applies in the Quebec Caisse de Depot. A 30% common share ownership would give effective control over most companies and raises the spectre of politics affecting business decisions. However, measures could be taken if this were a concern, for example by restricting the share ownership of government funds to 10% and restricting the involvement of government appointees in the affairs of the company.

It should be noted that the change in investment policy would be unnecessary from the viewpoint of members' security. Investment of the public service and teachers' funds in market securities would not add to the members' security or make it more certain that the pensions will be paid when they fall due. A private concern may go bankrupt and be unable to pay the promised pensions unless a pension fund is held by a third party. By contrast a government, although it may run into financial difficulties, can still meet its obligations so long as it has the power to raise taxes.

4. An Alternative to Market Investments - a Hypothetical Portfolio

It would be possible to credit the funds with interest at the rate of return on a hypothetical portfolio, as a surrogate for a market fund. The fund would consist of deposits with a return designed to mimic large private sector pension funds; the return could be the average of a specified group of large funds whose performance is regularly measured. This approach has been adopted for the federal Public Service Superannuation Fund, but creates considerable instability in the interest credited from year to year.

To illustrate this instability, suppose the PSSF commencing on January 1, 1980 had been credited with investment income equal to the return on a portfolio consisting of 50% Canadian equities and 50% Canada long bonds. In this case the government payments of investment income in 1980 - 1985 would have been as shown below, compared with actual payments.

TABLE 5

HYPOTHETICAL AND ACTUAL INVESTMENT INCOME OF PSSF

	Interest Rate on 50/50 Portfolio	Hypothetical Payments to PSSF ($million)	Actual Payments to PSSF ($million)
1980	16.10%	282	164
1981	-6.64%	-143	193
1982	24.26%	515	239
1983	22.54%	622	291
1984	6.35%	220	323
1985	25.16%	945	393

In this example, the government payments would have ranged from a high of $945 million to a withdrawal of $143 million, apart from the government's regular contributions and special payments.

Even if an averaging method were used to smooth the interest rates, the payments of investment income would be so variable and unpredictable as to make this approach very unattractive. Crediting the funds each year with the rate of return on a hypothetical diversified portfolio should be rejected, because the government's payments would vary too greatly from year to year.

The question of public sector pension fund investment is being studied by a Task Force chaired by Malcolm Rowan, whose report should be available before any decision is reached on this matter. In the meantime here are my recommendations.

5. Recommendations

(8) The net cash flow to the PSSF and TSF funds, that is the excess of the contribution income plus investment return plus maturities of the present investments over the outgo for benefits, should be invested in marketable securities in the same manner as the cash flow of a private sector pension plan.

(9) The fund manager should not be restricted by legislation in carrying out his or her responsibilities, except by the provisions of the Pension Benefits Act.

(10) In selecting investments the fund manager should not be required by the government to consider the social aspects of investment or the potential advantages to the Ontario economy, nor should the manager be prohibited from doing so.

(11) Employees who are members of the plans should have minority representation on the investment committees responsible for directing the investment policy, including the selection of fund managers, brokers, investment counsel, measurement services and the like.

(12) Any investment policies relating to social investments or investments to improve the Ontario economy should require the approval of a majority of members of the investment committee including all employee committee members.

PART V ASSESSMENT OF THE ECONOMIC ASSUMPTIONS USED TO VALUE THE BASIC AND SABA BENEFITS

1. Actuarial assumptions compared

The most important actuarial assumptions for valuing the basic PSSF and TSF are the interest rate and the rate of general salary increase which depend on the underlying inflation rate. For the SAFs the inflation rate is involved directly, as well as interest and salary assumptions.

Other assumptions such as the rate of mortality, withdrawal, disability and retirement also have a significant effect on valuation results, but it can only be assessed by an analysis of the actual experience of the group. We assume in what follows that these demographic assumptions have been appropriately chosen, having regard to the actual rates experienced by the particular group.

A further important item in the valuation balance sheet is the value placed on the assets. In the valuations of the TSF, PSSF and SABA funds by Actuarial Services of Management Board of Cabinet, the book value of the assets is used, no attempt having been made to determine a market value, because the assets are not marketable. In other public and private sector plans with invested assets the value of the fund is sometimes taken as book value, but more often is market value or market-related value, or an actuarially determined value.

In the valuation of the Teachers' Superannuation Fund by Eckler Partners Ltd., as at December 31, 1984 the book value of the pension fund ($7,584 million) is increased by the value of interest expected to be earned by these currently held assets in excess of the valuation rate ($3,178 million). Going further, credit is also taken in the TSF for interest in excess of the valuation rate expected to be earned for a few years after the valuation date on investments not yet made ($1,249 million). It can be argued that this credit is a legitimate asset, but it is a creative and unconventional concept rarely if ever found in the valuations of other pension funds.

The PSSF and SABA have been valued by the Actuarial Services of Management Board using "streamed valuation assumptions". In other words the assumptions as to interest, general salary increases and inflation vary for several years in the future, taking into account the information available at the valuation date as to the likely trends in these items. The rates assumed after the period of variation are known as "ultimate rates". In order to facilitate comparisons, level assumptions as to interest, salary escalation and inflation, that are approximately equivalent to the streamed assumptions, have been derived.

The terms of the PSSF and TSF are essentially the same, with minor variations mostly related to differences in the employment contracts of the two groups. Further the investments have the same terms and bear the same interest rates. It is difficult therefore to see why such fundamentally different valuation methods and assumptions should be used for the two plans. A more uniform approach to the valuations would facilitate comparisons and aid understanding by plan members, the government and taxpayers.

The following table compares the assumptions adopted for the five major Ontario public sector pension plans:

TABLE 6

ECONOMIC ASSUMPTIONS FOR PUBLIC SECTOR PLANS

Fund	Interest	Salary	Asset Value
PSSF - streamed to ultimate rates of	6%	4-1/2% + promotion	Book
TSF	7%	6% + promotion	Book + value of excess interest
OMERS	7%	6%	Actuarial (10% below market)
Ontario Hydro	8%	8%	Actuarial (5% below market)
HOOPP	6-1/2%	5-1/2%	Book (8% below market)

The SAF actuarial basis also includes the specific assumption that inflation, measured by increases in the Consumer Price Index, will be 4.0% per annum after 1993.

The indications are that the assumptions adopted by the PSSF and TSF are less conservative than those commonly adopted by other funds, but this is justifiable because the margin that commonly exists in other funds is not needed.

Private sector pension plans do not as a rule provide inflation protection through an automatic escalation formula, although many provide ad hoc increases. OMERS, HOOPP and Ontario Hydro also grant ad hoc increases. The funds are valued on a conservative actuarial basis so as to generate surplus which can be used to finance future ad hoc adjustments and other benefit improvements. This reason for conservatism does not exist in the valuation of the basic PSSF and TSF, since inflation protection has been provided through the separate funds under SABA.

2. Real investment returns

The streamed valuations by Actuarial Services of Management Board assume that the new money interest rates will decline from 1986 to 1992 and will be 6.00% thereafter. The nominal salary increase, excluding promotion and seniority, is assumed to be 4.50% after 1993 for the public service and after 1995 for teachers. The assumed escalation of pensions, that is the inflation rate, is streamed to 4.00%.

Accordingly the assumption is that a real return of 2.00% will be achieved on investments in long Ontario bonds made after 1995 and that real salaries will increase at 0.50%. These may be compared with actual historical returns, annualized over different periods.

TABLE 7

ANNUALIZED REAL RETURNS AND REAL INCREASES OVER VARIOUS PERIODS

Period		Treasury Bills	Federal Long Bonds	Provincial Bonds	Common Stocks	Wage & Salary Index
(CANSIM Number)		B14001	B14013	B14014	D1439	
5 years	1961-65	1.97%	3.19%	3.27%	11.88%	2.24%
	1966-70	2.41	-0.24	-0.98	1.53	3.27
	1971-75	-2.24	-4.79	-3.22	-3.96	2.21
	1976-80	1.45	-3.71	-2.26	14.39	0.18
	1981-85	6.23	9.58	10.14	2.47	0.30
10 years	1966-75	0.06	-2.54	-2.10	-1.25	2.74
	1976-85	3.81	2.72	3.75	8.27	0.24
25 years	1961-85	1.93	0.68	1.28	5.04	1.63

The CANSIM numbers refer to the source of the statistics, which are published by Statistics Canada.

Annualized returns over the last 50 and 60 years are published, but since they would be affected by the great depression and the war, the 25 year return appears to be the best guide.

The PSSF, TSF and SAFs are invested in the equivalent of long Ontario bonds, the return on which is intermediate between that of federal bonds and provincial bonds, being about 0.4% above the federal rates. It is clear that the returns on government bonds have been exceptionally high in the last 5 years, following 10 years when they were unusually low. A fair conclusion is that the long term return is likely to be near the return for the last 25 years, that is not above 1.5% per annum. The assumption of a 2% real return, if the present investment policy continues, is optimistic. If, as recommended, the future cash flow were invested in a mixed portfolio of market securities, the return is likely to be represented by a fund of 50% common stocks and 50% bonds. Looking at the historical record in the table a real return of 3% per annum can be assumed.

3. Real salary increases

Real salary increases have been less volatile than real investment returns. In the last 10 years the Wage and Salary Index has risen slowly, but over a longer period the growth rate has averaged 1-1/2% to 2% a year in real terms. The question arises whether the salaries of public servants and teachers have risen - and are likely to rise in future - at the same rate as, or faster or slower than, the national average of wages and salaries.

Appendix Table A exhibits the salary averages of active members of PSSF and TSF at various dates as shown in the actuarial reports.

The public service salary average from 1976 to 1985 rose slightly faster than the Wage and Salary Index - a little faster for females than for males. In the 1965 to 1976 period the salaries in the public service did not rise as fast as the index. Over the 20 year period females gained about 4% relative to the Wage and Salary Index, while males lost about 3%.

The average salaries of active teachers from 1972 to 1985 rose considerably faster than the Wage and Salary Index; once again females advanced more than males. Over the 13 years female teachers gained 29% over the Wage and Salary Index and male teachers 10%.

Unfortunately there is little to indicate whether the trends will continue and whether the salaries of PSSF and TSF members will rise faster or slower than the Wage and Salary Index in future. Accordingly, an assumption of 1.5% per annum real growth in salaries (the historical real rate of increase in the Wage and Salary Index) appears justified for both the PSSF and TSF. This is 1.0% higher than the rate assumed in current PSSF and TSF valuations.

As mentioned elsewhere in this report, high inflation transfers liability away from the basic plans to the SAFs. Thus inflation can easily mask the inadequacy of other assumptions in the valuation of the basic plans. If however the basic and adjustment funds were combined, the effect of inflation would be largely eliminated and the real rate assumptions would govern the strength of the valuation. Indications are that the real rate assumptions, unless investment policy were changed, would result in the contributions and unfunded liabilities of a combined fund being understated.

4. Economic Assumptions for Valuing the PSSF

The following summarizes the post-1993 economic assumptions in current valuations of the Public Service Superannuation Fund:

	Interest	Salary	Inflation
Nominal rates	6.0%	4.5%	4.0%
Real rates	2.0%	0.5%	--
Suggested real rates based on historical record	1.5%	1.5%	

Recognizing that the historical statistics are very volatile and an imperfect guide, the following tentative conclusions may be drawn:

(1) The real interest rate assumption is too high by 1/2%, if the fund remains in deposits bearing the same interest rates as Ontario debentures.
(2) The assumed rate of salary increase is too low by 1.0%.
(3) It would be more appropriate to assume ultimate real returns of 1.5% and real salary increases of 1.5%.
(4) The current assumptions probably understate the required contribution rate and the liability (so that the unfunded liability is underestimated or the surplus overestimated).

Thus the economic assumptions are inconsistent with the present investment policy of PSSF and the probable rates of real salary growth. However, an interest rate assumption of 3.0% real would be consistent with a policy of diversified investments, (say 50% in common stocks and 50% in bonds). In this case the differential between the interest and suggested salary assumptions would be 1-1/2%, as it is in the present valuations.

5. Economic Assumptions for Valuing the TSF

The official valuation of the TSF assumes 7% interest and salary inflation of 6%. The assets, which at December 31, 1984 had a book value of $7,584 million, have been revalued at 7% to produce $10,756 million and a further credit has been taken for $1,249 million, described as "the present value of expected excess interest on debentures to be issued in the years 1985 to 1987 inclusive". Accordingly assets with a book value of $7,584 million have been valued at $12,005 million.

The 7% interest assumption is arbitrary but in line with many other valuations. The 6% salary increase assumption provides a 1% "gap" between the interest rates and salary increases. The valuation report states that this is reasonable in the light of the historical relationship between Ontario bond yields and increases in the general level of salary and wages.

As indicated in the comments on the PSSF assumptions, the historical evidence is that a gap of 1% is too high for a fund invested in long term Ontario debentures.

Further, the salaries of teachers have since 1972 been rising considerably faster than the general Wage and Salary Index, as mentioned earlier, although it is uncertain whether this trend will continue.

A valuation of the TSF using the same economic assumptions as in the PSSF valuation has been prepared by Actuarial Services of Management Board. These assumptions, for the reasons noted above, probably underestimate the true liabilities of the funds; that is they overestimate the surplus.

As at December 31, 1984 the official valuation of the TSF found a surplus of $693 million. The Management Board's valuation estimated the surplus as $521 million. The difference may not be significant since there were differences in demographic assumptions and methodology.

If the real return on the TSF's debentures is 1.5% as suggested by the historical record, the actuarial assumption of 7% interest implies an inflation rate of 5.5% in the long term. This is quite possible, althought most actuaries and economists would consider a long term inflation assumption of 5 1/2% to be high. In conclusion the valuations of the PSSF and TSF appear to understate the liabilities to about the same extent.

6. Economic Assumptions for Valuing the SABA Benefits

The funds under SABA have been valued to determine the present value of the contributions, benefits and the unfunded liability. The assumptions are the same as those used by Actuarial Services of Management Board for the corresponding basic funds. Accordingly the economic assumptions, being the same as for the valuations of the PSSF and TSF, are subject to the comments noted above. Having regard to the investments held by PSSAF and TSAF, the liabilities have probably been understated.

7. Recommendations

(13) The PSSF and TSF should be valued by the same actuarial method and using the same actuarial assumptions except where probable differences in demographic or economic conditions can be demonstrated.

(14) If the present investment policy is unchanged the PSSF and TSF valuations should use streamed economic assumptions with ultimate real rates of interest of 1-1/2% per annum and real salary increases of 1-1/2% per annum adjusted for promotion and seniority.

(15) If the investment policy is changed to allow the purchase of market securities, the ultimate real interest rate assumption should be raised to 3% per annum.

PART VI - VALUING PENSIONS WITH GUARANTEED INCOME PROTECTION

1. Value of a fully indexed pension

The costs and liabilities of the plans that provide the fully indexed pensions of public servants and teachers should be realistically valued. The rate of interest appropriate for valuing fully indexed pensions is a major factor in determining contribution rates to be paid by employees and the government.

As public service and teachers' pensions are contractually indexed at the rate of increase in the Consumer Price Index, the pensioner bears no risk that his or her purchasing power will be impaired by inflation. The only exception occurs if the rate of CPI increase exceeds 8%. In these circumstances the pension adjustment is limited to 8% in the year, but the excess is carried forward to subsequent years. Subject to this exception, plan members are free of inflation risk.

It is recommended for reasons given in Part III of this report that the current method of indexing the PSSF and TSF benefits should be retained.

2. Investment Policy, Economic Assumptions, Inflation Protection and Risk

Before addressing in detail what interest rates should be used to value indexed pensions, it is useful to review the relationship between a pension plan's investment policy, the real interest rates that should govern the choice of economic assumptions used to value the indexed pensions and the short run risks faced by the plan sponsor and plan members when inflation protection is guaranteed and when it is provided from excess interest.

Chart 2 summarizes this important relationship. This Chart includes an analysis of risk, which has different meanings with respect to plan members and plan sponsors.

The risk to the members, barring bankruptcy of the employer, is variability in the purchasing power of their pensions; in defined benefit plans it lies in the degree of inflation protection. As noted above public servants and teachers are at present practically risk free.

CHART 2

RELATIONSHIP AMONG INVESTMENT POLICY, ECONOMIC ASSUMPTIONS, RISK AND THE TYPE OF INFLATION PROTECTION

Investment Policy	Annualized Real Return %	Annual Variability	Estimated Long Run Cost	RELATIVE RISK UNDER TWO INDEXING METHODS			
				Guaranteed Indexing		Excess Interest	
				Member	Sponsor	Member	Sponsor
(1) 100% T-bills	1.9	Low	High	None	Low	Low	Low
(2) 100% Long Canada bonds	0.7	High	Highest	None	High	High	High
(3) 100% Equities	5.0	Highest	Lowest	None	Highest	Highest	Highest
(4) 50% Bonds, 50% Equities	3.0	High	Medium	None	High	High	High

Member risk is variability in real value of benefits

Sponsor risk is variability in short run pension plan costs

The risk to the plan sponsor is variability in short run costs resulting from changes in unfunded liabilities, which in turn depend on investment performance. An aggressive investment policy may produce high returns in the long run but unacceptably high short run costs when the market is depressed.

Chart 2 presents the estimated expected annual real returns of selected assets based on actual historical performance over the 25 year period 1961-85 (which appears to be as good an estimate of future returns as can be obtained). The long run cost and risks to members and plan sponsors have been assessed qualitatively.

Variability has been judged from the following table:

TABLE 8

VARIABILITY OF INVESTMENT RETURN 1961-85

Investment Policy	Annualized real return	Arithmetic mean real return	Standard Deviation
100% T-bills	1.9%	2.0%	3.2%
100% Long Canada Bonds	0.7%	1.2%	12.0%
100% Equities	5.0%	6.4%	17.9%
50% Bonds 50% Equities	3.0%	3.8%	11.3%

A technical note on this table is needed. Variability is measured by the standard deviation around the arithmetic mean. We may expect the return for a year to be within one standard deviation of the arithmetic mean about 68% of the time. The arithmetic mean of the returns is higher than the annualized return which is the geometric mean. The level interest rate assumption to produce the same results as the historical returns is the annualized return.

An investment policy of 100% in Treasury Bills produces an expected annualized real return of 1.9% which results in relatively high estimated long run costs. If inflation protection is guaranteed there would be no risk to plan members and plan sponsors would face low risk because of the low variability in the real returns available on T-

bills. Under an excess interest formula, members would face some risk that their pensions may not receive as much inflation protection as they expected, although with a T-bill portfolio this risk is low. Because it is assumed that the nominal value of a pension will never be reduced, the sponsor also faces some risk.

An investment policy of 100% in long Canada bonds has the lowest expected annualized real return of 0.7%, if the historical record is to be believed, which results in the highest estimated long run cost. If inflation protection is guaranteed the members face no risk, but the plan sponsor faces significant risk because of the high variability in the real returns on a bond portfolio. With excess interest indexing, both members and the plan sponsor face significant risk because of the variability in annual real returns on bonds.

An investment policy of 100% in equities has the highest expected annualized return of 5.0% and this results in the lowest estimated long run cost. While the plan member faces no risk if inflation protection is guaranteed, the variability is highest which means that plan sponsors face the highest risk. If inflation protection is based on excess interest, then the 100% equity investment policy imposes a high level of risk both on the members and the plan sponsor.

An investment policy of 50% bonds and 50% equities has an intermediate expected annualized real return of 3.0% which results in an estimated medium level of long run costs. If inflation protection is guaranteed the plan member faces no risk, but the plan sponsor assumes a level of risk that is comparable to that under the 100% bond portfolio. This is because the variability of the 50/50 portfolio is almost the same as the variability of the 100% bond portfolio. However, with a 50/50 investment policy the plan sponsor has the advantage of assuming the risk at a lower expected level of long run pension costs. With excess interest indexing both members and the sponsor assume levels of risk that are comparable to those they would face under a 100% bond portfolio. But again, a 50/50 investment policy is better than 100% in bonds since it produces in the long run higher returns and lower costs for the same risk.

3. Treasury Bills minimize the risk to the fund

As indicated in Chart 2, the reserve fund that would enable a fully indexed pension to be paid with minimum risk of producing a deficit in the pension fund would consist of short term fixed interest government guaranteed securities, such as 91 day Treasury Bills, the return on which most closely tracks changes in the CPI. The annualized real return on 91 day Treasury Bills net of inflation over the 25 year period 1961-85 was 1.9%. This suggests if a pension fund is invested

in such a way as to eliminate uncertainty the interest rate used to value the fully indexed pensions should not exceed 2%. The 8% limitation on pension increases puts some risk on the pensioner, but this is offset by the carry-forward and by the provision that pensions will never decrease.

James Pesando in a paper published in the Canadian Journal of Economics gives reasons why the valuation interest rate relevant for an indexed pension should not exceed the expected real return on a T-bills only portfolio. An individual who wished to obtain a constant stream of annuity income in real terms would (in the absence of indexed investment instruments) have to be content with a return comparable to that on T-bills. Hence the value to the individual would be the value calculated at the real interest rate on T-bills. At the time of publication of Pesando's paper, the average real return on a T-bills only portfolio was estimated to be about 1.0%. This was based on historical data over the 28 year period 1953-1980. More recent data, for the 25 year period 1961-1985, shows an average real return of 2.0% for T-bills.

4. Recommendations of Canadian Institute of Actuaries on transfer values

The Canadian Institute of Actuaries, at the request of the federal Minister of Finance, has made recommendations for the computation of transfer values for indexed pensions. The transfer out of a pension fund should not, the Institute says, affect the financial status of the fund. For fully indexed pensions, the Institute selected a particular investment (5 year mortgages) to determine the real rate of return, net of inflation. The interest basis recommended for valuing fully indexed pensions is 1/2% less than the real return on 5 year mortgages for the first year, the rate being adjusted over 5 years to reach a long term real rate of 3% per annum. The 3% rate is considered by the Institute to be fair for the average employer and therefore implies a mixed portfolio of stocks, bonds and other assets.

The underlying principle adopted by the CIA is that transfer values should, to the extent possible, reflect market conditions. Hence the 3% valuation rate recommended by the CIA for indexed pensions implies that plan sponsors would not modify their investment portfolios in the direction of short term fixed interest securities so as to minimize the risks associated with financing indexed benefits. As noted in Part VII paragraph 5, some private sector plan sponsors may move to T-bills or similar short term instruments to cover the liabilities for indexed pensions, but others would not.

5. Insurance Company assumptions for indexed pensions

A major insurance company recently announced that it is offering fully indexed annuities, the amount payable being proportionate to the Consumer Price Index. The prices of these annuities enable an estimate to be made of the real interest rate, net of inflation, inherent in the contracts. The insurer's assumptions have not been made public, but the insurer has quoted the following amounts of monthly life annuity that can be bought for $100,000 single premium:

	Non-Indexed Annuity	Fully Indexed Annuity
Male age 65	$988.91	$630.97
Female age 60	$897.96	$528.93

Assuming that the purchase price of the annuity is loaded 3.5% for commission and expenses and that a modern annuitants mortality table is used, the above quotations imply that the insurer expects to earn an average interest rate of 2.8% - 3.0% in excess of the inflation rate. From a purchaser's point of view the loading should be ignored and the purchaser can anticipate receiving a real interest return of about 2.4% - 2.6% on the investment.

6. Interest rate implied by investment policy of basic and SABA funds

The present investment policy of the PSSF, TSF and the SABA funds is represented by the second line in Chart 2, that is 100% in long bonds. However the 0.7% expected annualized return must be increased by 0.4% because the funds are invested in Ontario long term debentures which bear a higher interest rate than Canada bonds (see Appendix B). Hence the real return to be expected under the present investment policy is 1.1%.

Current valuations of the PSSF assume a long run real return of 2.0%, as do the valuations of the TSF by Actuarial Services of Management Board. Hence the return assumption is in excess of the 25-year historical level of 1.1% for Ontario bonds. This suggests that the investment return assumptions used to value the TSF and PSSF have been high relative to the investment policy currently pursued by the plans.

The investment policy recommended in this report, which is to hold a diversified portfolio of marketable securities, is best represented by the fourth line in the chart. The expected real return would be 3.0% a year with slightly less variability than that of the present holdings.

Assuming that all the cash flow into the funds, including the proceeds at maturity of the existing debentures, were invested as we have recommended, it would be several years before the fund was predominantly in market securities. In the meantime the expected real return would be a blend of the 1.1% and 3.0% real returns.

An analysis of the PSSF projected cash flow from the end of 1985, assuming investments of new money commencing in 1986 in market securities earning rates 1% higher than current assumptions, indicates that the percentage of the Fund in these market securities would be 50% at the end of 6 years, 67% after 10 years, and 81% after 15 years.

PART VII ESTABLISHING MEMBERS' CONTRIBUTION RATES

1. Matching contributions

The Public Service and Teachers Superannuation Acts specify the rates of contribution that shall be paid by the members of the plan. The Acts also require the government to match these contributions and to liquidate any deficiencies by payments out of the Consolidated Revenue Fund. No reference is made to the disposition of surplus that may arise in the PSSF and TSF.

Under SABA, employees are required to contribute to the Superannuation Adjustment Funds 1% of salary and the employer contributes an equal amount. A Review Committee for each fund is required to review from time to time the rate of contribution to the Adjustment Fund and to make recommendations thereon to the Minister. There is no reference to the treatment of surplus or deficiency.

The principle that the contributions of employer and employee should be equal is thus well established. However the matching contributions have not always produced sufficient money to maintain solvency of the PSSF and TSF. The government has assumed responsibility for unfunded liabilities and since 1965 has been obliged by the Pension Benefits Act to amortize them over specified periods of years. More recently surplus has arisen in both funds, the disposition of which is still undecided.

In the 11 year period April 1, 1974 to March 31, 1985 the government made special payments to the PSSF amounting in total to $364.6 million on account of deficiencies. Similarly in the 11 year period January 1, 1975 to December 31, 1985 the government made special payments to the TSF amounting in total to $1235.7 million on account of deficiencies.

The regular contributions of employees and the government and the special contributions of the government are shown in Appendix D and are illustrated in Charts 3 and 4.

The Royal Commission on the Status of Pensions in Ontario recommended that:

> "The principle of "matching contributions" in all public sector plans providing defined benefits should be abandoned, and both legislation and established policies setting contributions on a matching basis in such plans should be amended so that contribution rates reflect the true cost responsibilities under the plan."

CHART 3

PUBLIC SERVICE SUPERANNUATION FUND
EMPLOYER – EMPLOYEE CONTRIBUTIONS
1975–1985

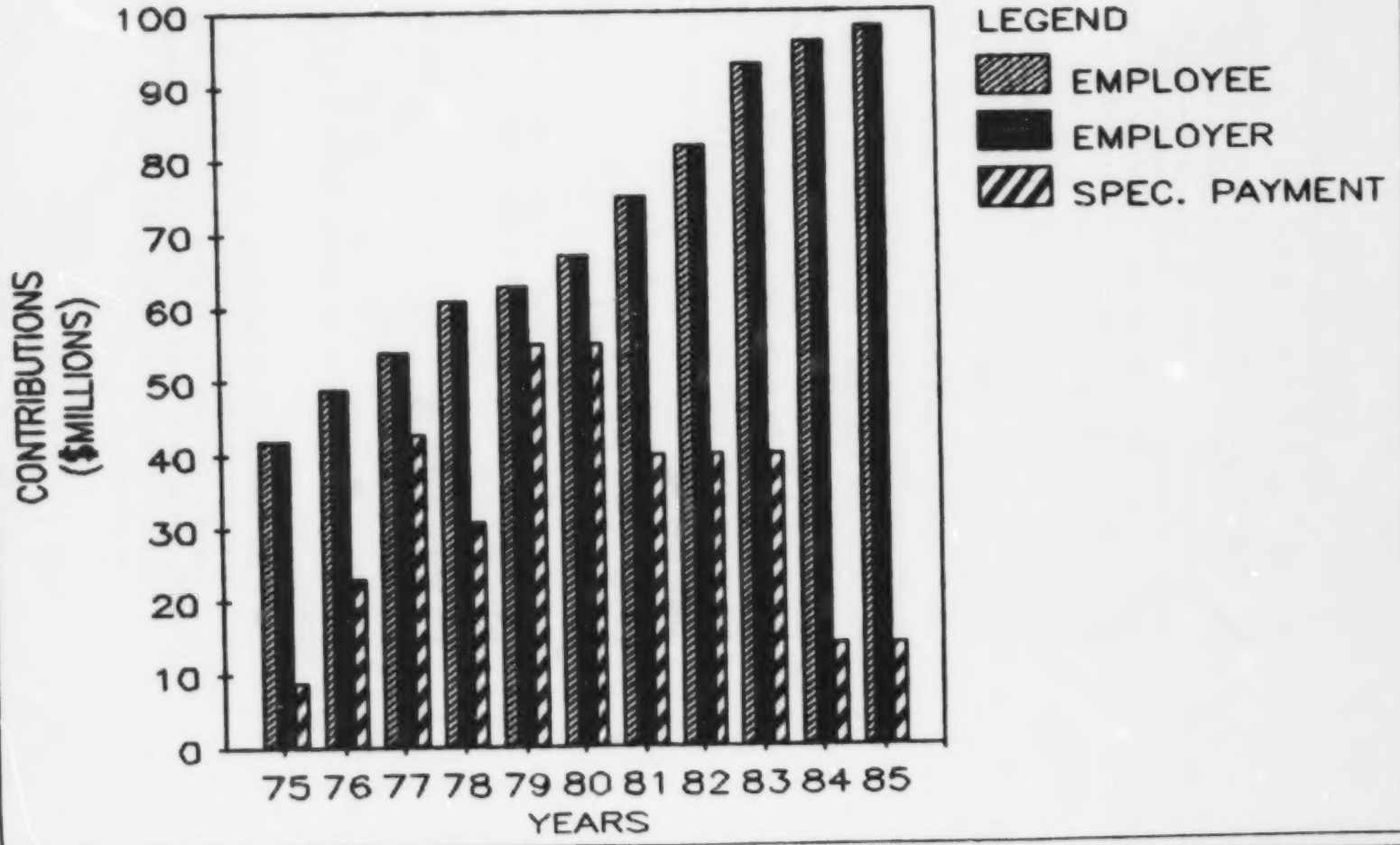
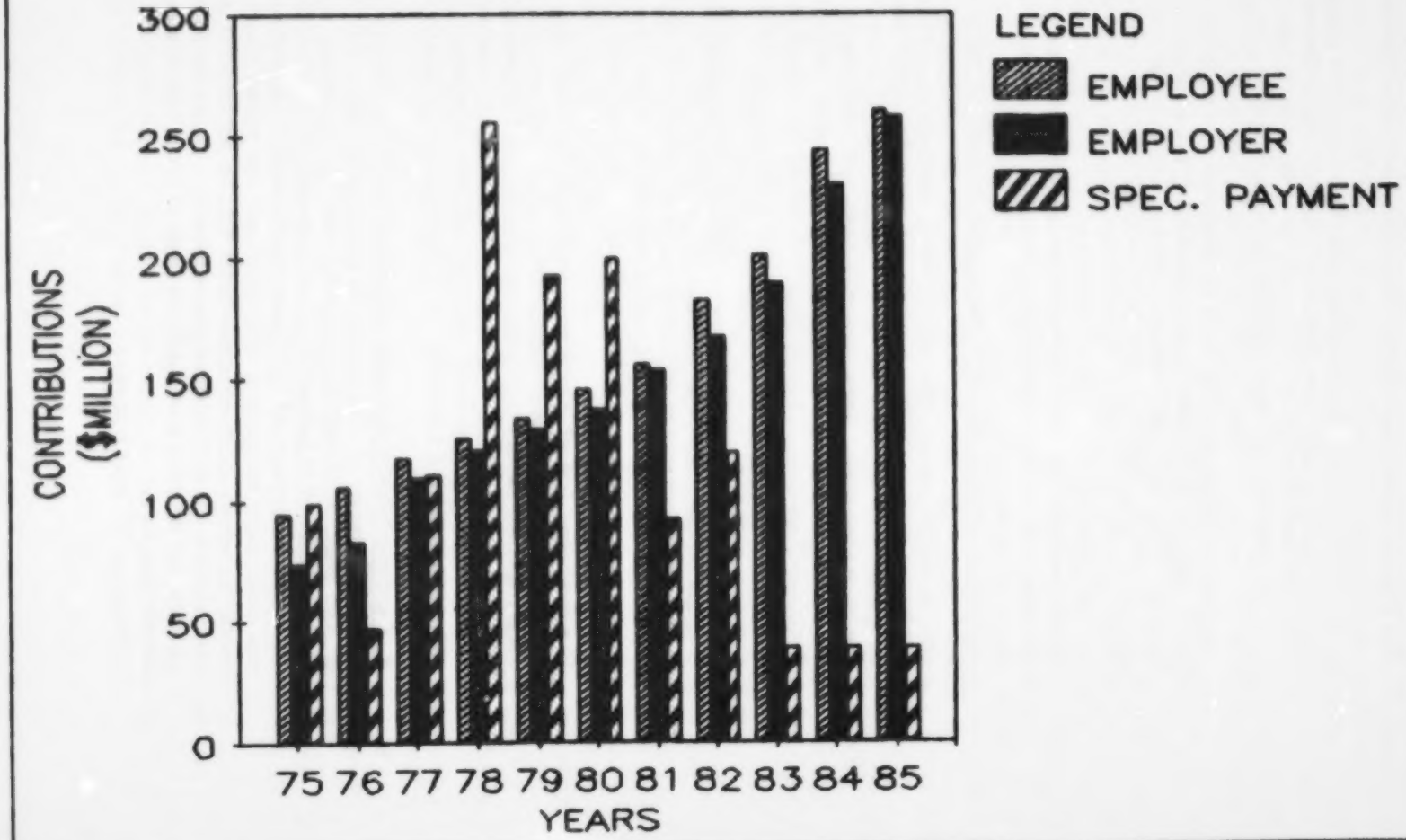


CHART 4

TEACHERS' SUPERANNUATION FUND
EMPLOYER — EMPLOYEE CONTRIBUTIONS
1975—1985



The Select Committee endorsed this recommentation and commented:

> "This particular recommendation recognizes formally what has been a funding practice for almost 16 years. The adoption of this recommendation would create no additional employee contributions or change employee contribution rates."

The matching contribution principle was established at a time when it was believed that conditions affecting pension plans would be stable. In fact this has not been the case; during the 1970s large deficiencies arose and during the 1980s large surpluses. The Royal Commission's recommendation is that the employer's contributions should take account of any deficiency or surplus, so that the employer would pay the balance of cost, as is the practice in defined benefit pension plans in the private sector.

2.Reorganization requires new contribution rates

This is not to say, however, that the matching contribution principle should not apply at the outset when employees' contribution rates are first established. The employees' contributions could well be set originally at a level which is calculated to cover half the cost of the pension plan. Once established, the employees' contribution rate would not be varied merely because the actual experience differed from what was expected - the effects on costs of these differences would be absorbed by the employer.

The employees' contributions would not be altered without careful consideration. However, it would be reasonable to redetermine the employees' contribution rate if the plan were amended in such a way as to increase costs significantly, or if it were considered that fundamental and permanent economic or demographic changes had occured.

The amalgamation of the basic PSSF and TSF with the corresponding SAFs clearly requires the establishment of a new contribution basis. In view of the history of these funds and the understandings on which SABA was introduced, the members' contribution rates should be designed to pay for half the cost of the benefits as near as can be determined at this time.

3. Interest rate assumptions

The investment of the funds in provincial deposits and debentures has in the past produced low returns and if the basic and adjustment funds are considered together has contributed to the combined deficiencies. It would be unfair if the poor performance of the existing funds in the past were to govern the contribution rates charged to plan members, especially as the contribution rates will apply to new members and recently enrolled members. Contribution rates should be calculated on the basis of the anticipated returns on future investments.

On the other hand the actuarial valuations to determine the unfunded liabilities must obviously take account of the returns on the actual investments. This can be accomplished by using a stream interest valuation, similar to that currently in use for the PSSF.

4. Pre-retirement economic assumptions

The historical experience of balanced pension funds and the comparison with the returns on private sector funds in the surveys of SEI Financial Services suggest that the assumed real rate of interest in the period prior to retirement should be 3% a year. The assumption recommended by the Canadian Institute of Actuaries for the calculation of transfer values also lends support to a 3% basis.

Consistent with this interest assumption the assumed growth of real salaries should be 1.5% a year, plus increases for promotion and seniority. As noted in Part II, inflation affects the cost of a pension plan to some extent even if rates of return and salaries are increased by the same amount as a result of inflation; hence an inflation assumption is needed. A long term inflation assumption of 4 1/2% per annum would be reasonable.

This 4 1/2% inflation assumption implies an interest rate assumption of 7 1/2% per annum and a salary increase assumption of 6% per annum. These rates should be used in the pre-retirement period, for purposes of calculating the members' contribution rates.

5. Post-retirement interest rate assumption

The interest rate to be used in the post-retirement period to value fully indexed pensions depends on the attitude of the employer to investment risks. A private pension fund providing fully indexed pensions would probably be invested in such a way as to stabilize costs and minimize risk. The almost universal opposition of private sector employers to mandatory inflation protection suggests that many plan sponsors would try to shed the additional risk of providing inflation protection. They could invest more of the fund in short-term instruments such as T-bills that have lower but more predictable returns. The risk can be reduced by investing the reserves for retired members and members with deferred benefits in such securities.

If the government were to follow the investment policy that would probably be adopted by risk-averse sponsors of private sector pension plans in response to 100% inflation protection, then the assumed interest rate for valuing the fully indexed TSF and PSSF benefits after retirement should not exceed 2% per annum.

Further, it can be argued that members should contribute 50% of the value that would be placed on their benefits by the private sector. The economic value of a fully indexed annuity if purchased or provided in the private sector is the value calculated at an interest of 2% or less, as suggested by Professor Pesando (Part VI paragraph 3).

These considerations suggest that an interest rate of 2% should be used in the post-retirement period to calculate the members' contribution rates.

However the government may be in the position of not needing or wishing to minimize short term risks at the price of substantially higher PSSF and TSF costs. The variability of return from year to year is not of great concern in large public funds such as the PSSF and TSF and it is doubtful that the government would wish to segregate the assets applicable to retired and terminated employees from those for active members, with different investment policies for the two sectors.

As to comparability with the private sector, even if inflation protection were mandated some private sponsors would invest aggressively and adopt a policy of building up a contingency reserve from the gains in good years to cover any deficiencies in years when inflation was high and investment return low. Maintaining such a reserve fund means that the employer could not immediately reduce his contributions by the amount of gains since they would go to reserve. Nevertheless this is a practical approach that many sponsors would take.

Under our proposals, the PSSF and TSF would consist of the new marketable securities plus the declining balance of the present non-marketable investments. The expected real investment return on the new money would be about 3% a year net of inflation. Hence if the government would accept a degree of variability in the market portfolio, consistent with that tolerated by many private sector employers, a post-retirement real interest assumption of 3% would be appropriate.

6. Minimum employer contributions under the Pension Benefits Act

The revised Pension Benefits Act, 1987, will require a slight modification of the matching contribution principle. Under Section 40 of the Act employers' contributions must provide at least 50% of a pension earned on or after January 1, 1987. Hence a member's contributions made after 1986 shall not be used to provide more than 50% of the commuted value of the pension or deferred pension in respect of the contributory benefit accrued after that date. If the member's contributions accumulated with interest exceed 50% of the value of the pension benefits in respect of service after 1986 the member is entitled to receive the excess, in addition to the pension benefit defined in the plan.

Hence the employer will be required to pay for every individual a minimum of 50% of the value of his or her vested pension benefit. Since the employer will pay more than 50% of the cost for some individuals, for instance those who have larger than average salary increases, the employer must in the aggregate provide more than half the cost of the vested benefits.

Employees who terminate employment with less than two years of service receive only a refund of their contributions with interest and in these cases the employer pays nothing. However, it is unlikely that the financial relief from those who terminate after very short service will be significant. Hence the revised Pension Benefits Act would make it impossible for the employees to be charged contributions that would cover exactly half the cost.

7. Calculated contribution rates

Entry age normal costs are shown below for the PSSF and TSF including the costs of indexing now being provided through the SAFs.

It is assumed that the inflation rate will be 4.5% per annum and that salaries will increase at a real rate of 1.5% (that is 6.0% nominal). The real interest rate for the reasons discussed in Part VI is assumed to be 3% in the period prior to retirement (that is 7.5% nominal) and either 3% or 2% in the post retirement period (that is, nominal rates of 7.5% or 6.5% respectively). On this basis the members' contribution rates are found to be:

TABLE 9

MEMBERS' CONTRIBUTIONS - ENTRY AGE NORMAL COST

	Public Service		Teachers	
	A	B	A	B
Before Pension Reform	8.55%	9.34	9.86%	10.87%
After Pension Reform	9.07	9.91%	10.24%	11.24%

A - Real interest rate 3% pre-retirement, 3% post-retirement
B - Real interest rate 3% pre-retirement, 2% post-retirement

These members' contribution rates should be reduced by 1.8% of earnings between the YBE and the YMPE under the Canada Pension Plan.

Calculations have been made on other assumptions to show the powerful effects on the contribution rates of changes in the assumed interest rate or salary scale. The inflation rate, as explained in Part II, has relatively little effect if the real interest rate and real salary scale remain unaffected.

TABLE 10
MEMBERS' CONTRIBUTIONS - ENTRY AGE NORMAL COST

Assumptions			PSSF		TSF	
Interest	Salaries	Inflation	Before Reform	After Reform	Before Reform	After Reform
7%	5%	4.5%	8.59%	9.18%	9.80%	10.20%
7%	6%	4.5%	9.47%	10.05%	11.01%	11.42%
7.5%	6%	4.5%	8.55%	9.07%	9.86%	10.24%
8%	6%	4.5%	7.76%	8.25%	8.85%	9.21%

These members' contribution rates should be reduced by 1.8% of earnings between the YBE and the YMPE under the Canada Pension Plan.

8. Recommendations

(16) The contribution rates for members should be one-half of the full and true cost for a new entrant of the combined basic and SAF benefits, as near as it can be found, recognizing that the government will have to provide something extra for employees who benefit from the 50% cost-sharing rule in the revised Pension Benefits Act.

(17) Members' contribution rates should be based on the expected return on future market investments, not the existing investments.

(18) In determining members' contribution rates, the economic assumptions in the pre-retirement period should be:

Real investment return	3% per annum
Real salary increases	1-1/2% per annum plus promotion and seniority
Inflation rate	4-1/2% per annum

(19) In determining members' contribution rates, the economic assumptions in the post-retirement period should depend on the investment policy and philosophy of the government.

(a) If the government's policy is to minimize its risks by investing pensioners' reserves in short term fixed interest securities or to base the contribution rates on the economic value of fully indexed pensions, a real interest rate of 2% per annum should be used.

(b) If the government is prepared to absorb the risks of variability in market investments a real interest rate of 3% per annum should be used.

(20) The post-retirement interest rate assumption should apply to the benefits of pensioners, terminated employees and survivors. It should apply to the pensions of active employees from the point at which they retire or terminate from the service.

(21) Members' contribution rates once determined for the combined basic and SAF funds should not be changed unless the benefits are increased or fundamental economic or demographic changes have occurred.

PART VIII - METHODS OF FINANCING THE PENSION SYSTEM

In Part VII it is recommended that members' contributions for the combined basic and adjustment funds should be sufficient to provide 50% of the benefit cost for an average new entrant, calculated using certain assumptions. The government as employer would pay matching contributions and also liquidate the unfunded liability over a period of years (say 15 or 25 years). The costs and liabilities involved in this "entry age normal" arrangement are shown later in this Part.

A number of recognized actuarial techniques are available for financing pension funds. Methods that might be considered suitable for funding the PSSF and TSF are described below. In order to illustrate the differences between these methods, the payments required have been derived from the regular valuations by Actuarial Services of Management Board of the position as at December 31, 1985, together with some supplementary calculations. The valuation balance sheets are reproduced in Appendix E.

Thus, all the estimates in this Part are based on Management Board's assumptions. It should be noted that these assumptions differ from the recommended assumptions in Part IX.

1. Assumptions

The calculations have been made on the following basis:

(1) It is assumed that the PSSF and TSF are amalgamated with their respective SAFs. The possibility of improving the financing of the SAF in isolation from the basic funds is reviewed in Appendix C but this course is not recommended.

(2) The financial results do not include the increased costs resulting from the revision of the Pension Benefits Act 1987 which will become effective in 1988.

(3) It is assumed that equal contribution rates will be paid by employer and employee towards the current service cost.

(4) The liabilities now being financed by appropriations from the Consolidated Revenue Fund have been excluded. These liabilities for pre-1976 retirees, amounting at December 31, 1985 to $510,605,000 for the public service and $901,784,000 for teachers, should remain a charge on the CRF.

(5) The actuarial assumptions are those of the "streamed interest valuations" made by Actuarial Services of Management Board. Fairly reliable information is available as to the return on the assets and probable salary increases for several years after the valuation date. For these reasons streamed interest and salary assumptions are appropriate. The interest rate assumption is streamed to 6.0%, salary increases are streamed to 4.5% and the inflation assumption is 4.0%. (The corresponding assumptions, recommended and used in Part IX, are 7.5%, 6.0% and 4.5% respectively.)

(6) The amortization of unfunded liabilities is based on the streamed interest assumptions used in the PSSF and TSF valuations by Actuarial Services of Management Board. The amortization factors (value of 1 per annum) are as follows:

Period	PSSF Stream	TSF Stream
15 years	7.6245	7.5510
25 years	9.4937	9.3786

(7) The annualized salaries of PSSF members at December 31, 1985 amounted to $2,218.0 million. The total payroll of public servants in 1986 has been taken as 2-1/2% higher, that is $2,273.4 million.

The total salaries of active and part-time teachers during the year 1985 amounted to $4,349.3 million. The total payroll of teachers in 1986 has been taken as 5% higher, that is $4,566.8 million.

2. Aggregate funding

Under aggregate funding a contribution rate is established, such that the present value of future contributions plus the value of the fund is equated to the value of all benefits for past and future service of pension plan members (excluding future entrants). Because the calculated contribution rate ensures that assets and liabilities balance, there is no unfunded liability.

Table 12 presents the results of this method. Under aggregate funding the contribution rates would be 12.95% for public service employees and 12.83% for teachers (reduced by 1.8% of contributory earnings under the Canada Pension Plan). Matching contributions would be paid by the government. There would be no unfunded liability to be liquidated by special payments.

Based on 1986 salaries, the members' contributions to the expanded PSSF and TSF would amount to $263 million and $525 million respectively, matched by the employer.

The pension fund should be valued regularly, at least once every three years and preferably annually. After each valuation the contribution rates would be adjusted so as to equate the assets and liabilities. The contribution rates would vary depending on the fortunes of the fund and also because of new entrants for whom a somewhat lower contribution rate would be adequate. The contribution rate would probably decline slowly.

3. Funding with supplemental liability based on service before effective date of new system

Under this method a contribution rate is established which is sufficient to provide all benefits earned for service after the effective date of the new system (taken as December 31, 1985 for the purposes of the cost estimates). The unfunded liability is the value of all benefits earned for service before the effective date, together with indexing thereon, reduced by the amount of the pension fund assets.

It could be argued that this unfunded liability arose through the past operations of the system when inflation rates were exceptionally high and that it cannot be fairly charged to present employees now that inflation rates are lower. Presumably the government would liquidate the unfunded liability over a period of years, consistent with private sector practice.

Table 13 presents the results of this method, which may be summarised as follows:

	Present Contribution Rate	Required Contribution Rate	Unfunded Liability ($millions)
Public Service	7.00% - CPP	9.15% - CPP	$1,598
Teachers	7.90% - CPP	9.67% - CPP	$3,460

Matching contributions would be made by the government, which would also be responsible for the unfunded liability.

The amortization payments in millions of dollars would be:

	Unfunded Liability	Unfunded Liability Payments Over 15 yrs.	Over 25 yrs.
Public Service	$1,598	$210	$168
Teachers	$3,460	$458	$369

In addition to these equal annual payments the contributions required fro employees, to be matched by the employers, would amount to $176 million f the public service and $398 million for the teachers, based on 1986 salaries.

4. Funding with supplemental liability equal to the SABA liability based service before 1976

A reasonable alternative would be to isolate all SAF liabilities arising from service before SABA was introduced in 1976, other than the liabiliti for pre-1976 retirees which will be paid from the CRF. A contribution ra would be established sufficient to provide all other benefits from the amalgamated plan, with indexing thereon, after taking credit for the valu of the pension fund.

The SAF liabilities for pre-1976 service should be the responsibility of the government. They have the same nature as the past service costs created when a pension plan is established or improved. The rationale is that the members began to contribute to SABA in 1976 and that contributio made in any year should be related to the pensions earned in the same yea The members did not contribute towards the indexing of pensions accrued before 1976 and cannot now be expected to pay for this benefit.

Calculations have been made by Actuarial Services of Management Board to divide the SAF liabilities into those related to pre-1976 and post-1976 service.

Table 14 presents the costs and liabilities under this method. The resul may be summarized as follows:

	Present Contribution Rate	Required Contribution Rate	Unfunded Liability (millions)
Public Service	7.00 - CPP	9.47% - CPP	$1,461
Teachers	7.90 - CPP	10.21% - CPP	$2,870

The amortization payments in millions of dollars would be:

	Unfunded Liability	Unfunded Liability Payments Over 15 yrs.	Over 25 yrs.
Public Service	$1,461	$192	$154
Teachers	$2,870	$380	$306

In addition to these equal annual payments the contributions required from employees, to be matched by the employer, would amount to $183 million for the public service and $423 million for the teachers, based on 1986 salaries.

5. Accrued benefit funding

Under this method the unfunded liability is the value of all benefits earned for service before the effective date, together with indexing thereon, reduced by the amount of the pension fund assets. Hence the unfunded liability is the same as in the method described in paragraph 3.

The employer is required to contribute the cost of the benefits earned for the year of service following the valuation date, allowing for future salary increases, less the amount of the members' contributions. An entry age normal method is generally used to determine the rate of members' contributions - which have therefore been taken as 8.55% less CPP for the public service and 9.86% less CPP for teachers.

The employer's normal cost for the first year, 1986 is found to be $120 million for the public service and $264 million for the teachers. The employer's normal cost is not a fixed percentage of salaries but will be recalculated every year and will vary. In addition the employer will pay for any losses or receive credit for any gains arising from benefits for service before the valuation date as revealed in actuarial valuations. The employer will also have to liquidate the unfunded liability by payments as follows (millions of dollars):

TABLE 11

SUMMARY OF EMPLOYER COSTS BASED ON DIFFERENT VALUATION METHODS AS AT DECEMBER 31, 1985

Basic and SAF combined. Excludes pension reform. Streamed valuation assumptions of Management Board. Unfunded liability over 15 years.
(Millions of dollars)

Valuation Method	Contribution Rate (1)	Unfunded Liability	Estimated employer cost in 1986		
			Normal	Special	Total
		$M	$M	$M	$M
Aggregate					
Public Service	12.95%	--	263	--	263
Teachers	12.83%	--	542	--	542
Liability for service before 1986					
Public Service	9.15%	1598	176	210	386
Teachers	9.67%	3460	398	458	856
Liability for SAF pre-1976					
Public Service	9.47%	1461	183	192	375
Teachers	10.21%	2870	423	380	803
Accrued benefit (2)					
Public Service	--	1598	120	210	330
Teachers	--	3460	264	458	722
Entry age normal					
Public Service	8.55%	1848	163	242	405
Teachers	9.86%	3195	407	423	830

(1) Reduced by 1.8% of contributory earnings under the Canada Pension Plan

(2) Members' contribution rates 8.55% for public service and 9.86% for teachers; Employer's contributions variable.

TABLE 12

AGGREGATE FUNDING METHOD - AS AT DECEMBER 31, 1985
(thousands of dollars)

	Public Service	Teachers
Aggregate liabilities (ex. CRF liabilities)	9,194,482	23,093,681
Deduct Pension Fund assets	4,341,223	10,114,043
Deduct Value of future Contributions at present rates	2,354,238	7,588,020
Balance of liability	2,499,021	5,391,618
Equivalent to member contributions (matched by employer) of	5.95%	4.93%
Present contribution rate	7.00% - CPP	7.90% - CPP
New contribution rate	12.95% - CPP	12.83% - CPP

TABLE 13

UNFUNDED LIABILITY BASED ON SERVICE BEFORE 1986
(thousands of dollars)

	Public Service	Teachers
Value of benefits of pensioners, terminated members and survivors	2,708,425	3,742,184
Value of accrued benefits of active members	3,741,251	10,733,611
Total value of accrued benefit	6,449,676	14,475,795
Deduct value of benefits charged to CRF	510,605	901,784
	5,939,071	13,574,011
Deduct pension fund	4,341,223	10,114,043
Unfunded liability	1,597,848	3,459,968
Value of future service (unaccrued) benefits	3,255,411	9,519,670
Value of future contributions at present rates	2,354,238	7,588,020
Balance of future service cost	901,173	1,931,650
Equivalent to member contributions (matched by employer)	2.15%	1.77%
Present contribution rate	7.00% - CPP	7.90% - CPP
New contribution rate	9.15% - CPP	9.67% - CPP

TABLE 14

UNFUNDED LIABILITY EQUAL TO THE SAF LIABILITY FOR SERVICE BEFORE 1976
(thousands of dollars)

	Public Service	Teachers
Value of SAF benefits to pensioners, terminated members and survivors arising from service before 1976	773,719	1,011,235
Value of SAF benefits to active members arising from service before 1976	533,156	1,679,534
Estimated value of SAF benefits arising from service before 1976 paid from fund between 1976 and 1985	154,000	179,000
Total unfunded liability for pre-1976 SAF benefits	1,460,875	2,869,769
Balance of total liability minus the pension fund	3,392,384	10,109,869
Members contribution rate required (matched by employer)	9.47% - CPP	10.21% - CPP

TABLE 15

ENTRY AGE NORMAL FUNDING
(thousands of dollars)

	Public Service	Teachers
Value of benefits to pensioners terminated members and survivors	$2,197,820	$2,840,040
Value of benefits of active members	6,996,662	20,201,281
	$9,194,482	23,041,321
Deduct value of normal contributions*		
Members	1,502,436	4,865,620
Province	1,502,436	4,865,620
Deduct fund (estimated)	4,341,223	10,114,043
Unfunded liability	$1,848,387	$3,196,038

*Public Service 8.55% - CPP, Teachers 9.86% - CPP.

PART IX - FUNDING RECOMMENDATIONS AND COST ESTIMATES

1. Recommended funding basis

It is now time to bring together the conclusions as to members' contribution rates, the interest rates appropriate for valuing a fund invested in market securities and the preferred valuation method. Further, it is necessary to recognize the amendments to the PSSF and TSF that will be required by the Pension Benefits Act, 1987. Accordingly, the valuation results are given both before and after such amendments, that is before and after pension reform.

In this Part the economic assumptions employed in the valuations are those suitable for a fund in which new money is being invested in market securities. The assumptions are those recommended in Part V, that is streamed economic assumptions with ultimate real rates of investment return of 3.0% per annum and ultimate real salary increases of 1.5% plus promotion and merit increases. We have also assumed tht inflation will be 4.5% per annum in future. The valuation balance sheets on the recommended basis are reproduced in Appendix F.

Accordingly the nominal rates assumed in this Part are:

Interest 7.5%	Salaries 6.0%	Inflation 4.5%

These compare with the current Management Board's basis:

Interest 6.0%	Salaries 4.5%	Inflation 4.0%

The recommended valuation basis is less conservative than the Management Board's basis, that is, it produces lower liabilities. This is because the recommended basis assumes that the fund will move into stocks and bonds producing higher returns than the present assets.

As an alternative, if the government is risk-averse as explained in Part VII, the interest rate should be reduced by 1% once the employee leaves active service.

To recapitulate, the background to the valuation results that follow is:

(1) The basic PSSF and TSF should be amalgamated with the corresponding SAFs and valued as single units.

(2) Inflation protection should continue to be provided by indexing pensions in proportion to increases in the CPI subject to an 8% maximum in any one year.

(3) Future cash flow should be invested in market securities, possibly with the pensioners' reserves in short-term money instruments.

(4) Members' contribution rates should be 50% of the cost for an average new entrant of the combined basic and SAF benefits, as recommended in Part VII.

(5) The ultimate economic assumptions should be 3% real interest rate, 1.5% real salary increases plus merit and seniority and 4.5% inflation; alternatively a 2% real interest rate could be assumed after retirement if the government wishes to minimize its risks.

(6) Streamed interest rate and salary increase assumptions should be used for a number of years after the valuation date, blending into the ultimate rates.

(7) The entry age normal valuation method should be adopted with unfunded liabilities being amortized over a period as discussed below.

2. Liquidation of Unfunded Liabilities

The Pension Benefits Act distinguishes between "initial unfunded liabilities" that arise when a pension plan is created or amended and "experience deficiencies" that arise from adverse experience. The employer must make special payments with respect to these obligations. The former must be liquidated by equal annual payments over a term not exceeding 15 years from the date on which the unfunded liability arose. Experience deficiencies must be liquidated by equal annual payments over not more than 5 years.

Exceptions to these rules were made for unfunded liabilities existing on January 1, 1965 when the Pension Benefits Act became effective. Such unfunded liabilities were allowed to be paid off over 25 years from 1965, so that the last payment under this section of the regulations will be in 1989. Further, interest only could be paid on the unfunded liability at January 1, 1965 under a pension plan for employees of a government.

Let us compare four liquidation schedules.

(a) Equal annual payments over 15 years. This is currently the standard method under the Pension Benefits Act and is widely used in the private sector. It may, however, be regarded as excessively severe for a government plan.

(b) Equal annual payments over 25 years. Legislation would be required to authorize the liquidation of unfunded liabilities over 25 years, either in the form of amendments to the Pension

Benefits Act or amendments to the PSSF and TSF. It might be argued in justification that the full indexing of these public sector plans has the effect of lengthening the average period between the time when a pension benefit accrues and the time when it is paid. Thus 25-year amortization is likely to ensure that the total of special payments will be sufficient at all times to cover the total of actual benefit outgo to which they relate. Furthermore, the 15-year period in the Pension Benefits Act was chosen to provide adequate benefit security for private sector employees, whereas the benefit security of public servants and teachers is hardly in question.

(c) Interest only. When the Pension Benefits Act first became effective in 1965, the special payments with respect to unfunded liabilities for employees of government could be limited to annual amounts sufficient to prevent the liability from increasing. In effect this meant that interest only could be paid on the unfunded liability, interest being at the valuation rate of interest. Of course under this arrangement the capital amount of the liability would never be paid off, but it was believed that the employees of government need not be concerned as to the security of their pensions. Legislation would be needed to authorize an interest only basis. In the case of PSSF and TSF, streamed interest rates are used in the valuation and these would be applied to the unfunded liability; thus interest in the first year would be at 11.10%, gradually declining to 7.50%.

(d) Percentage of salary. Draft regulations under the Pension Benefits Act, 1987 allow the initial unfunded liability to be liquidated over 15 years by scheduled dollar payments, each of which is a constant percentage of the projected future payroll of members at the date of the valuation. The payment must be a percentage of the anticipated payroll of the closed group of members, estimated using the same actuarial assumptions as are used in the valuation. The anticipated payroll will tend to grow with salary increases and fall as members die, terminate and retire. All in all this method is too restrictive to be of much advantage to employers.

The effect of these four methods of paying for unfunded liabilities can be compared if we assume that an unfunded liability of $1,000,000 has to be amortized by annual special payments in arrears.

The amortization factors over 15 and 25 years, calculated by Actuarial Services of Management Board on the recommended interest rate assumptions are:

Period	PSSF	TSF
15 years	7.5412	7.5187
25 years	9.2312	9.2166

ANNUAL PAYMENTS TO AMORTIZE $1,000,000

	Public Service	Teachers
Equal annual payments over 15 years: present minimum requirement	$132,605	$133,001
Equal annual payments over 25 years: no longer allowed	$108,328	$108,500
Payment of interest only at valuation rate: no longer allowed	$111,000	$111,000
Level percentage of salary: allowed in draft regulations	$139,716	$115,066

Under the third and fourth method the payments will vary after the first year.

It is recommended that the unfunded liability be amortized by equal annual payments over 15 or, if legislation is changed, over 25 years.

3. Costs on the recommended basis

Table 16 displays the contribution rates, unfunded liabilities and employer costs of the public service and teachers' plans on a fully funded basis using the recommended assumptions. Figures include costs both before and after pension reform. More detail of the valuation balance sheets is provided in the four tables in Appendix F.

If the recommendations in this report are accepted and if the government is prepared to accept the risks of providing full inflation protection and adopting a policy of market investments at the same time, then the government's obligation to the PSSF is to pay the normal cost equal to 9.07% of payroll less 1.8% of CPP contributory earnings and to liquidate an unfunded liability of $1,557 million. For the TSF the normal cost is 10.24% less CPP and the unfunded liability is $2,772 million.

Based on the number of staff at the end of 1985 and the estimated 1986 payrolls, the required payments would be as follows (millions of dollars);.

	Normal Cost	Unfunded Liability over 15 years	Total employer Cost
Public Service	$174	$206	$380
Teachers	$418	$369	$787

These costs cover the basic plans and the benefits under SABA, other than those that are being provided from the Consolidated Revenue Fund, and allow for the improvements required by the amended Pension Benefits Act. They do not, however, allow for any retroactive extension to past service benefits of changes that the Pension Benefits Act requires in future service benefits.

4. Recommendations

Based on the considerations in Part VIII and in this Part IX the following recommendations for funding are made:

(22) After the members' contribution rate has been realistically established, the employer should pay the balance of cost as determined by actuarial valuations, being obliged to amortize any deficit and being entitled to benefit from any surplus.

(23) The existing surplus in the PSSF and TSF should be carried forward and used to offset the unfunded liabilities of the PSSAF and TSAF when the basic and adjustment funds are combined.

(24) The entry age normal valuation method should be employed in valuing the PSSF and TSF after they have been combined with the corresponding SAFs.

(25) Streamed interest rate and salary rate assumptions should be used for a few years after the valuation date to take account of known facts. The ultimate real rate of return should be 3% (or 3% before retirement and 2% after retirement if the government is risk-averse); and the ultimate real salary increases should be 1.5% plus seniority and promotion.

(26) The unfunded liability existing at the first valuation of the amalgamated basic and SABA funds should be liquidated by equal annual payments over 15 or 25 years.

(27) Any gains or losses arising in the periodical actuarial valuations should be used to decrease or increase the government's contributions during the next five years after the valuation date.

TABLE 16

SUMMARY OF EMPLOYER COSTS BASED ON
RECOMMENDED VALUATION METHOD AND ASSUMPTIONS

Basic and SAF combined. Streamed valuation assumptions
merged to 7-1/2%, 6%, 4-1/2%
Unfunded liability over 15 years. Millions of dollars

	Contribution Rate (1)	Unfunded Liability(2) $M	Estimated Employer Cost		
			Normal $M	Special 15 years $M	Total 15 years $M
BEFORE PENSION REFORM					
Employer accepts investment risk (3)					
Public Service	8.55%	1460	163	194	357
Teachers	9.86%	2482	365	330	695
Employer minimizes investment risk (4)					
Public Service	9.34%	2114	181	280	461
Teachers	10.87%	4019	444	535	979
AFTER PENSION REFORM					
Employer accepts investment risk (3)					
Public Service	9.07%	1557	174	206	380
Teachers	10.24%	2773	418	369	787
Employer minimizes investment risk (4)					
Public Service	9.91%	2211	193	293	486
Teachers	11.24%	4229	421	562	1022

(1) Reduced by 1.8% of contributory earnings under the Canada Pension Plan.
(2) Excludes indexing of pre-1976 benefits, charged to CRF.
(3) Real interest rate 3% before and after retirement.
(4) Real interest rate 3% before retirement, 2% after retirement.

PART X - TIMING OF AMENDMENTS TO PUBLIC SECTOR PLANS

1. Action urgently required

It is highly desirable that the recommended changes be made with a minimum of delay. The Royal Commission which reported in 1980 recommended immediate action to phase out the PSSAF, TSAF and RAF, and to determine the full and true cost of all pension benefits provided to employees in the Ontario public sector. The Select Committee on Pensions supported the Royal Commission's recommendations in 1982. A number of reasons could be cited to account for the delay in taking action on these recommendations, but it is clear that the procrastination should cease.

The position of funds under SABA is deteriorating in spite of the fact that the funds are still increasing. If no action is taken until the funds are exhausted the unfunded liability will have greatly increased.

Projections indicate that the PSSAF will be exhausted in 2001, when the contribution income will be $101 million and the benefit payments $267 million; the TSAF will probably be exhausted in 2008 when the contribution income will be $265 million and the benefit outgo $1,173 million. Clearly steps should be taken well before this serious position is reached.

A further reason for revising the arrangements at this time is the surplus shown by the latest valuation of the PSSF and TSF. The valuations as at December 31, 1985 show a surplus of $110 million in PSSF compared with a deficit of $2,609 million in PSSAF; and a surplus of $479 million in TSF compared with a deficit of $5,871 in TSAF. High rates of inflation in recent years had the effect of raising interest rates and thus improving the position of the basic funds, while the liabilities resulting from inflation fell on the PSSAF and TSAF. The presence of a surplus in the basic funds can only lead to unfounded optimism and could generate requests that the basic plan benefits be improved.

2. Pension Reform

Bill 170, an Act to revise the Pension Benefits Act, received Royal Assent on June 29, 1987 and most of its provisions will come into effect on January 1, 1988. This Act, which implements a number of pension reform proposals that have been agreed to by other jurisdictions, requires significant changes in Ontario's public sector

pension plans. Amendments to the PSSF, TSF and Ryerson SF required by the Act and the amendments proposed in this report can most conveniently be made at the same time. If the employees are expected to share in the cost of the amendments required by the Pension Benefits Act as well as the cost of indexing, contribution rates should be adjusted only once. A single increase in members' contributions, embracing both these changes, would be much preferable and acceptable than two separate contribution increases.

Table 16 provides estimates of the employers' costs of PSSF and TSF, including indexing, before and after pension reform.

3. Recommendations

(28) Action should be taken with a minimum of delay to phase out the SAFs and to put the funding on a sound basis.

(29) The amendments to the PSSF, TSF and RSF recommended in this report should be made at the same time as amendments required to comply with the Pension Benefits Act, 1987.

APPENDIX A

SALARY INCREASES OF PUBLIC SERVANTS AND ACTIVE TEACHERS

Average salaries at December 31 derived from actuarial reports on PSSF and TSF.

Public Service	Average Salary			Ratio		
	1965	1976	1985	1976/1965	1985/1976	1985/1965
Males	$6526	$16342	$31791	2.504	1.945	4.871
Females	$4760	$11534	$24919	2.423	2.160	5.235
Males & Females	$5924	$14583	$28952	2.462	1.985	4.887
Corresponding increase in Wage and Salary Index				2.571	1.958	5.035

Teachers	Average Salary			Ratio		
	1972	1975	1985	1975/1972	1985/1975	1985/1972
Males	$12943	$16635	$43090	1.285	2.590	3.329
Females	$ 9279	$11802	$35971	1.272	3.048	3.877
Males & Females	$10792	$13896	$39253	1.288	2.825	3.637
Corresponding increase in Wage and Salary Index				1.396	2.177	3.018

APPENDIX B

INTEREST AND INFLATION RATES (1976-85)

Calendar Year	Credited to PSSF	CIA Report on Canadian Economic Statistics		
		Long-Term Provincial Bonds	Long-Term Federal Bonds	CPI Increase
	%	%	%	%
1976	9.89	10.11	9.18	5.91
1977	9.59	9.53	8.70	9.46
1978	9.75	9.88	9.27	8.36
1979	10.75	10.74	10.21	9.80
1980	12.76	13.02	12.48	11.19
1981	14.87	15.95	15.22	12.10
1982	13.44	15.40	14.26	9.26
1983	12.86	12.62	11.79	4.55
1984	13.22	13.43	12.75	3.76
1985	11.99	11.67	11.04	4.35
1976-85	11.91 (Includes 0.125% expense saving)	12.23	11.49	7.87

APPENDIX C

FINANCING SABA BENEFITS IN ISOLATION

It is instructive to examine the methods by which the Superannuation Adjustment Funds could be placed in a fully funded position, independently of the basic plans. None of these methods is recommended, since there are powerful reasons why the basic funds and SABA funds should be united.

At present the SAFs are being financed by contributions equal to 1% of salary from the employees matched by 1% contributions from the employer. In 1986 the contribution income of the PSSAF was $52 million and the TSAF was $92 million. If no change were made in this contribution basis the PSSAF would be exhausted by 2001 and the TSAF by 2008, if not before. Thereafter massive increases in funding would be required from some source.

(a) Liquidate present SAF liabilities

Naively one might leave the regular 1% contribution from employee and employer unchanged and liquidate the unfunded liabilities over a period of years. For purpose of example 8% interest has been assumed in determining the amortization payments (shown below in millions of dollars).

The amortization payments would be as follows:

	Unfunded Liability on Dec. 31, 1985	Unfunded Liability Payments Over 15 Years	Over 25 Years
Public Service	$2609	$305	$244
Teachers	$5870	$686	$550

In addition to these annual payments the 1% contributions from the employees, matched by the employer, would be required and would produce approximately $52 million a year for public servants and $92 million a year for teachers, based on 1986 salaries.

This method would not provide a permanent solution to the financing problem. The payments noted above would not cover all the future liabilities, even if all the actuarial assumptions were realized, because the 2.0% contribution rate to the SAFs by and for future employees would be inadequate to provide their benefits under the Act.

(b) Entry age normal contribution

Another method, if the basic and SABA pension funds are to be kept separate, would be to raise the contribution rate to the level sufficient to provide the SABA benefits for a new entrant to the service. The balance of liability would be liquidated over a period of years as before.

The employees' contribution rate would become 2.54% for the public service and 2.98% for teachers, matched in each case by the employer. The contribution income of the PSSAF would therefore be $132 million and of the TSAF $274 million.

The amortization payments would be as follows (millions of dollars):

	Unfunded Liability on Dec. 31, 1985	Unfunded Liability Payments Over 15 Years	Over 25 Years
Public Service	$1963	$229	$184
Teachers	$3705	$433	$347

This solution is not recommended because, as explained in Part II, the inevitable changes in inflation rate will cause a seesaw shifting of liabilities between the basic plans and lthe supplementary indexation plans. Continuing the present artificial separation of the two parts of the system would only perpetuate the current confusions and misunderstanding about the true cost and value of PSSF and TSF pension benefits. Only the indexing costs for those who retired prior to 1976 and supplements should continue to be paid from the Consolidated Revenue Fund as they arise. All other indexing costs should be paid from the PSSF and TSF.

APPENDIX D

CONTRIBUTIONS TO PSSF AND TSF 1975-1985
(millions of dollars)

Pension Plan	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Public Service Superannuation Fund											
Employee	42.0	48.6	53.9	60.7	62.5	67.3	74.6	82.3	92.7	96.3	98.1
Employer	42.0	48.6	53.9	60.7	62.5	67.2	74.7	82.4	92.7	96.3	98.1
Special Payment	9.3	23.4	43.2	31.3	54.5	54.5	40.2	40.2	40.2	13.9	13.9
Total	93.3	97.2	107.8	121.4	125.0	134.5	149.3	164.7	185.4	192.6	196.2
Teachers Superannuation Fund											
Employee	94.7	106.1	117.8	125.5	134.2	146.8	155.8	183.2	201.0	244.2	261.2
Employer	74.4	83.4	110.1	121.4	129.7	138.3	153.6	168.0	190.3	230.3	258.2
Special Payment	99.2	46.8	111.2	255.9	192.5	200.2	92.8	119.8	39.1	39.1	39.1
Total	268.3	236..3	339.1	502.8	456.4	485.3	402.2	471.0	430.4	513.6	558.5

Note: Matching contributions from the province to the TSF are equal to the contributions of contributors. However, the timing of the province's contributions and an interest adjustment means that the provincial and members' contributions in any year are not equal.

EXHIBIT 1

PSSF AND SAF AND CRF APPROPRIATIONS COMBINED FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS		
(i) Fund (estimated)		
(a) PSSF	3,912,657	
(b) SAF	420,946	
		4,333,603
(ii) Value of future contributions		
(a) male	779,807	
(b) female	397,312	
		1,177,119
(iii) Value of matching contributions by the Province of Ontario		1,177,119
(iv) Contributions receivable with respect to past services already credited		7,620
(v) PSSF Unfunded Liability		(109,927)
(vi) SAF Unfunded Liability See Exhibit 3		2,608,948
(vii) CRF Unfunded Liability Under SABA See Exhibit 4		468,196
(viii) CRF Unfunded Liability For Supplement See Exhibit 5		42,409
TOTAL ASSETS		9,705,087

LIABILITIES	accrued		unaccrued		total	
(i) Value of Benefits Granted and payable in respect of:						
(a) male pensioners	1,244,017		579,916		1,823,923	
(b) female pensioners	349,491		155,244		504,735	
(c) widowers	6,725		2,626		9,351	
(d) widows	229,159		106,334		335,493	
(e) families of orphans	758		708		1,466	
(f) male deferred annuitants	10,524		13,826		24,350	
(g) female deferred annuitants	3,712		5,385		9,097	
		1,844,386		864,039		2,708,425
(ii) Value of Future Benefits Payable in respect of 44,968 Male Contributors:						
(a) Retirement pensions	2,534,170		1,946,006		4,480,176	
(b) Payments on death in service	96,031		75,125		171,156	
(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	234,766		163,487		398,253	
		2,864,967		2,184,618		5,049,585
(iii) Value of Future Benefits Payable in respect of 31,642 Female Contributors:						
(a) Retirement pensions	714,470		905,140		1,619,610	
(b) Payments on death in service	12,788		14,452		27,240	
(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	149,026		151,201		300,227	
		876,284		1,070,793		1,947,077
TOTAL LIABILITIES		5,585,637		4,119,450		9,705,087

EXHIBIT 2

PUBLIC SERVICE SUPERANNUATION FUND APPROPRIATIONS REQUIRED FOR PROVIDING BASIC PENSION ONLY

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985

(in thousands of dollars)

ASSETS			LIABILITIES	Accrued		Unaccrued		Total	
(i) Public Service Superannuation Fund (estimated)		3,898,765	(i) Value of Benefits Granted and Payable in respect of:						
(ii) Special payments due January 1, 1986		13,892	(a) 13401 male pensioners	859,621				859,621	
(iii) Value of future contributions			(b) 7206 female pensioners	218,615				218,615	
(a) male	642,923		(c) 357 widowers	3,523				3,523	
(b) female	324,314		(d) 6539 widows	106,873				106,873	
	-------	967,237	(e) 103 families of orphans	758				758	
(iv) Value of matching contributions by the Province of Ontario		967,237	(f) 428 male deferred annuitants	10,524				10,524	
			(g) 256 female deferred annuitants	3,712				3,712	
(v) Contributions receivable with respect to past service already credited		7,620		-------	1,203,626			-------	1,203,626
(vi) Unfunded liability			(ii) Value of Future Benefits Payable in respect of 44,968 Male Contributors:						
(a) At Jan.1, 1965	82,616		(a) Retirement pensions	1,700,005		1,315,422		3,015,427	
			(b) Payments on death in service	58,883		46,356		105,239	
(b) Related to deficiency at Dec.31,1976	28,910		(c) Deferred annuities, transfer payments and refund to those who will withdraw from service	103,795		70,999		174,794	
(c) Gain	(221,453)			---------	1,862,683	---------	1,432,777	---------	3,295,460
	---------	(109,927)	(iii) Value of Future Benefits Payable in respect of 31,642 Female Contributors:						
			(a) Retirement pensions	478,385		607,080		1,085,465	
			(b) Payments on death in service	8,858		10,064		18,922	
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	72,303		69,048		141,351	
				---------	559,546	---------	686,192	-------	1,245,738
TOTAL ASSETS		5,744,824	TOTAL LIABILITIES		3,625,855		2,118,969		5,744,824
		=========			=========		=========		=========

EXHIBIT 3

PUBLIC SERVICE SUPERANNUATION ADJUSTMENT FUND APPROPRIATIONS REQUIRED FOR ESCALATION UNDER SABA

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES				
				accrued declared		accrued undeclared	total
(i) Public Service Superannuation Adjustment Fund (estimated)		420,946	(i) Value of Escalation on Basic Pension to Recipients with an Inception Date in 1976-1985, and Payable in respect of:				
(ii) Value of Future Contributions			(a) male pensioners	229,584		490,993	720,577
(a) male	136,884		(b) female pensioners	54,934		114,421	169,355
(b) female	72,998		(c) widowers	1,204		1,852	3,056
		209,882	(d) widows	30,360		53,651	84,011
(iii) Value of matching contributions by the Province of Ontario			(e) families of orphans	0		386	386
		209,882	(f) male deferred annuitants	0		12,034	12,034
(iv) SAF Unfunded Liability for Value of:			(g) female deferred annuitants	0		4,774	4,774
(a) Accrued and declared, pensioners	(104,864)				316,082		678,112 994,194
(b) Accrued and undeclared, pensioners and actives	1,997,134		(ii) Value of Escalation on Future Benefits Payable in respect of Male Contributors:	accrued		unaccrued	total
(c) Unaccrued, actives	716,678		(a) Retirement pensions	834,165		630,584	1,464,749
		2,608,948	(b) Payments on death in service	37,148		28,769	65,917
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	130,971		92,488	223,459
					1,002,284		751,841 1,754,125
			(iii) Value of Escalation on Future Benefits Payable in respect of Female Contributors:				
			(a) Retirement pensions	236,085		298,060	534,145
			(b) Payments on death in service	3,930		4,388	8,318
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	76,723		82,153	158,876
					316,738		384,601 701,339
TOTAL ASSETS		3,449,658	TOTAL LIABILITIES		1,635,104		1,814,554 3,449,658

EXHIBIT 4

CONSOLIDATED REVENUE FUND APPROPRIATIONS FOR PUBLIC SERVICE EMPLOYEES REQUIRED FOR BENEFIT PAYMENTS UNDER SABA

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	accrued declared		accrued undeclared		total	
CRF Unfunded Liability for Value of:									
(i) Escalation on basic pension for pensioners with an inception date prior to 1976			(i) Value of Escalation on Basic Pension to Recipient with an Inception Date prior to 1976 and Payable in respect of:						
(a) accrued declared	227,809		(a) male pensioners	119,837		77,286		197,123	
(b) accrued undeclared	152,546		(b) female pensioners	50,611		32,308		82,919	
			(c) widowers	878		484		1,362	
			(d) widows	56,483		39,744		96,227	
			(e) families of orphans	0		322		322	
			(f) male deferred annuitants	0		1,792		1,792	
			(g) female deferred annuitants	0		611		611	
	380,355				227,809		152,546		380,355
(ii) Escalation on Supplement for Pensioners in (i)			(ii) Value of Escalation on Supplement Payable to (i):						
(a) accrued declared	54,460		(a) male pensioners	19,962		11,637			
(b) accrued undeclared	33,381		(b) female pensioners	14,383		8,515			
			(c) widowers	541		290			
			(d) widows	19,574		12,939			
	87,841				54,460		33,381		87,841
TOTAL ASSETS	468,196		TOTAL LIABILITIES		282,269		185,927		468,196

EXHIBIT 5

CONSOLIDATED REVENUE FUND APPROPIATIONS FOR PUBLIC SERVICE EMPLOYEES REQUIRED FOR PROVIDING SUPPLEMENT PENSION ONLY

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS		LIABILITIES	
CRF Unfunded Liability for Value of Supplement in Respect of:		Value of Supplement to Recipients with an Inception Date:	
(i) Pensioners with an inception date in 1976-1985	1,373	(i) In 1976-85	1,373
(ii) Pensioners with an inception date prior to 1976	41,036	(ii) Prior to 1976	41,036
TOTAL ASSETS	42,409	TOTAL LIABILITIES	42,409

EXHIBIT I

TSF AND SAF AND CRF APPROPRIATIONS COMBINED FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	accrued		unaccrued		total	
(i) Fund (estimated)			(i) Value of Benefits Granted and payable in respect of:						
(a) TSF	9,082,276		(a) male pensioners	1,105,750		514,888		1,620,638	
(b) SAF	1,031,767		(b) female pensioners	998,120		418,270		1,416,390	
		10,114,043	(c) widowers	54,082		18,972		73,054	
(ii) Value of future contributions			(d) widows	322,676		125,081		447,757	
(a) male	1,819,046		(e) families of orphans	1,068		1,162		2,230	
(b) female	1,974,964		(f) male deferred annuitants	36,226		19,282		55,508	
		3,794,010	(g) female deferred annuitants	82,244		44,363		126,607	
(iii) Value of matching contributions by the Province of Ontario		3,794,010			2,600,166		1,142,018		3,742,184
			(ii) Value of Future Benefits Payable in respect of 48,610 Male Contributors:						
			(a) Retirement pensions	5,769,544		4,390,534		10,160,078	
			(b) Payments on death in service	150,545		101,980		252,525	
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	154,302		86,632		240,934	
(iv) TSF Unfunded Liability		(479,026)			6,074,391		4,579,146		10,653,537
(v) SAF Unfunded Liability See Exhibit 3		5,870,644	(iii) Value of Future Benefits Payable in respect of 63,451 Female Contributors:						
			(a) Retirement pensions	4,168,818		4,582,006		8,750,824	
(vi) CRF Unfunded Liability Under SABA See Exhibit 4		831,261	(b) Payments on death in service	48,844		47,414		96,258	
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	325,382		259,104		584,486	
(vii) CRF Unfunded Liability For Supplement See Exhibit 5		70,523			4,543,044		4,888,524		9,431,568
			(iv) Value of Benefits Payable in respect of Inactive Contributors		116,176				116,176
			(v) Provision for Future Administration Expense				52,000		52,000
TOTAL ASSETS		23,995,465	TOTAL LIABILITIES		13,333,777		10,661,688		23,995,465

EXHIBIT 2

TEACHERS' SUPERANNUATION FUND APPROPRIATIONS REQUIRED FOR PROVIDING BASIC PENSION ONLY

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	Accrued		Unaccrued		Total	
(i) Teachers' Superannuation Fund (estimated)		9,082,276	(i) Value of Benefits Granted and Payable in respect of:						
			(a) 6557 male pensioners	741,528				741,528	
			(b) 12119 female pensioners	567,109				567,109	
			(c) 938 widowers	29,376				29,376	
(ii) Value of future contributions			(d) 5106 widows	169,994				169,994	
			(e) 97 families of orphans	1,068				1,068	
(a) male	1,559,867		(f) 445 male deferred annuitants	30,830				30,830	
(b) female	1,687,403		(g) 1559 female deferred annuitants	66,218				66,218	
	---------	3,247,270		-------	1,606,123			-------	1,606,123
			(ii) Value of Future Benefits Payable in respect of 48,610 Male Contributors:						
(iii) Value of matching contributions by the Province of Ontario		3,247,270	(a) Retirement pensions	3,870,045		2,961,442		6,831,487	
			(b) Payments on death in service	94,658		64,847		159,505	
			(c) Deferred annuities, transfer payments and refund to those						
(iv) Unfunded liability		(479,026)	who will withdraw from service	62,516		36,735		99,251	
				---------	4,027,219	---------	3,063,024	--------	7,090,243
			(iii) Value of Future Benefits Payable in respect of 63,451 Female Contributors:						
			(a) Retirement pensions	2,802,097		3,100,713		5,902,810	
			(b) Payments on death in service	33,548		33,192		66,740	
			(c) Deferred annuities, transfer payments and refunds to those						
			who will withdraw from service	144,117		119,581		263,698	
				---------	2,979,762	---------	3,253,486	-------	6,233,248
			(iv) Value of Future Benefits Payable in respect of Inactive Contributors:						
			(a) With Contributions in 1985 for less than 4 months	40,336				40,336	
			(b) No contributions in 1985	75,840				75,840	
				------	116,176			------	116,176
			(v) Provision for Future Administration Expenses			52,000		52,000	
						------	52,000	------	52,000
TOTAL ASSETS		15,097,790	TOTAL LIABILITIES		8,729,280		6,368,510		15,097,790
		==========			=========		=========		==========

EXHIBIT 3

TEACHERS' SUPERANNUATION ADJUSTMENT FUND APPROPRIATIONS REQUIRED FOR ESCALATION UNDER SABA

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS		
(i) Teachers Superannuation Adjustment Fund (estimated)		1,031,767
(ii) Value of Future Contributions		
(a) male	259,179	
(b) female	287,561	
		546,740
(iii) Value of matching contributions by the Province of Ontario		546,740
(iv) SAF Unfunded Liability for Value of:		
(a) Accrued and declared, pensioners	(639,458)	
(b) Accrued and undeclared, pensioners and actives	4,452,422	
(c) Unaccrued, actives	2,057,680	
		5,870,644
TOTAL ASSETS		7,995,891

LIABILITIES	accrued declared		accrued undeclared		total	
(i) Value of Escalation on Basic Pension to Recipients with an Inception Date in 1976-1985, and Payable in respect of:						
(a) male pensioners	179,845		416,886		596,731	
(b) female pensioners	147,717		282,692		430,409	
(c) widowers	7,534		11,749		19,283	
(d) widows	40,709		70,453		111,162	
(e) families of orphans	0		640		640	
(f) male deferred annuitants	4,330		18,236		22,566	
(g) female deferred annuitants	12,173		41,312		53,485	
		392,309		841,968		1,234,277
(ii) Value of Escalation on Future Benefits Payable in respect of Male Contributors:	accrued		unaccrued		total	
(a) Retirement pensions	1,899,499		1,429,092		3,328,591	
(b) Payments on death in service	55,887		37,133		93,020	
(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	91,786		49,897		141,683	
		2,047,172		1,516,122		3,563,294
(iii) Value of Escalation on Future Benefits Payable in respect of Female Contributors:						
(a) Retirement pensions	1,366,721		1,481,293		2,848,014	
(b) Payments on death in service	15,296		14,222		29,518	
(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	181,265		139,523		320,788	
		1,563,282		1,635,038		3,198,320
TOTAL LIABILITIES		4,002,763		3,993,128		7,995,891

EXHIBIT 4

CONSOLIDATED REVENUE FUND APPROPRIATIONS FOR TEACHERS REQUIRED FOR BENEFIT PAYMENTS UNDER SABA

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS

CRF Unfunded Liability for Value of:		
(i) Escalation on basic pension for pensioners with an inception date prior to 1976		
(a) accrued declared	440,994	
(b) accrued undeclared	251,757	
		692,751
(ii) Escalation on Supplement for Pensioners in (i)		
(a) accrued declared	90,217	
(b) accrued undeclared	48,293	
		138,510
TOTAL ASSETS		831,261

LIABILITIES

	accrued declared		accrued undeclared		total	
(i) Value of Escalation on Basic Pension to Recipient with an Inception Date prior to 1976 and Payable in respect of:						
(a) male pensioners	145,517		85,557		231,074	
(b) female pensioners	201,369		111,092		312,461	
(c) widowers	12,192		5,968		18,160	
(d) widows	78,486		45,061		123,547	
(e) families of orphans	0		522		522	
(f) male deferred annuitants	1,037		1,036		2,073	
(g) female deferred annuitants	2,394		2,521		4,915	
		440,994		251,757		692,751
(ii) Value of Escalation on Supplement Payable to (i):						
(a) male pensioners	22,021		12,445		34,466	
(b) female pensioners	46,125		24,486		70,611	
(c) widowers	2,709		1,255		3,964	
(d) widows	18,907		9,567		28,474	
(e) male deferred annuitants	8		10		18	
(f) female deferred annuitants	447		530		977	
		90,217		48,293		138,510
TOTAL LIABILITIES		531,211		300,050		831,261

EXHIBIT 5

CONSOLIDATED REVENUE FUND APPROPIATIONS FOR TEACHERS REQUIRED FOR PROVIDING SUPPLEMENT PENSION ONLY

STREAM INTEREST VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS		LIABILITIES	
CRF Unfunded Liability for Value of Supplement in Respect of:		Value of Supplement to Recipients with an Inception Date:	
(i) Pensioners with an inception date in 1976-1985	1,437	(i) In 1976-85	1,437
(ii) Pensioners with an inception date prior to 1976	69,086	(ii) Prior to 1976	69,086
TOTAL ASSETS	70,523	TOTAL LIABILITIES	70,523

PSSF AND SAF AND CRF APPROPRIATIONS COMBINED (BEFORE REFORM) FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST** VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	accrued		unaccrued		total	
(i) Fund (estimated)			(i) Value of Benefits Granted and payable in respect of:						
(a) PSSF	3,912,657		(a) male pensioners	1,219,840		575,727		1,795,567	
(b) SAF	420,946		(b) female pensioners	343,301		154,415		497,716	
		4,333,603	(c) widowers	6,628		2,609		9,237	
(ii) Value of future contributions			(d) widows	224,689		105,086		329,775	
(a) male	1,016,668		(e) families of orphans	756		681		1,437	
(b) female	523,839		(f) male deferred annuitants	9,544		13,366		22,910	
		1,540,507	(g) female deferred annuitants	3,375		5,119		8,494	
(iii) Value of matching contributions by the Province of Ontario		1,540,507			1,808,133		857,003		2,665,136
(iv) Contributions receivable with respect to past services already credited		7,620	(ii) Value of Future Benefits Payable in respect of 44,968 Male Contributors:						
(v) PSSF & SAF Unfunded Liability			(a) Retirement pensions	2,443,012		1,884,860		4,327,872	
- accrued	1,398,336		(b) Payments on death in service	90,523		71,690		162,213	
- unaccrued	61,258		(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	209,843		149,493		359,336	
		1,459,594			2,743,378		2,106,043		4,849,421
(vi) CRF Unfunded Liability Under SABA		464,054	(iii) Value of Future Benefits Payable in respect of 31,642 Female Contributors:						
(vii) CRF Unfunded Liability For Supplement		42,077	(a) Retirement pensions	690,763		879,131		1,569,894	
			(b) Payments on death in service	12,380		14,418		26,798	
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	134,033		142,680		276,713	
					837,176		1,036,229		1,873,405
TOTAL ASSETS		9,387,962	TOTAL LIABILITIES		5,388,687		3,999,275		9,387,962

**Stream to Interest 7.5%, Salary Inflation 6%, Escalation 4.5%
Contribution = EAN of 8.55% including CPP for employee matched by employer

APPENDIX F - 2

PSSF AND SAF AND CRF APPROPRIATIONS COMBINED (BEFORE REFORM) FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST** VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS

(i) Fund (estimated)		
(a) PSSF	3,912,657	
(b) SAF	420,946	
		4,333,603
(ii) Value of future contributions		
(a) male	1,127,515	
(b) female	583,020	
		1,710,535
(iii) Value of matching contributions by the Province of Ontario		1,710,535
(iv) Contributions receivable with respect to past services already credited		7,620
(v) PSSF & SAF Unfunded Liability		
- accrued	2,011,788	
- unaccrued	102,344	
		2,114,132
(vi) CRF Unfunded Liability Under SABA		500,558
(vii) CRF Unfunded Liability For Supplement		44,125
TOTAL ASSETS		10,421,108

LIABILITIES

	accrued		unaccrued		total	
(i) Value of Benefits Granted and payable in respect of:						
(a) male pensioners	1,301,666		655,051		1,956,717	
(b) female pensioners	365,447		174,679		540,126	
(c) widowers	7,007		2,934		9,941	
(d) widows	239,523		120,227		359,750	
(e) families of orphans	775		730		1,505	
(f) male deferred annuitants	11,124		16,540		27,664	
(g) female deferred annuitants	4,369		6,006		10,375	
		1,929,911		976,167		2,906,078
(ii) Value of Future Benefits Payable in respect of 44,968 Male Contributors:						
(a) Retirement pensions	2,730,761		2,114,957		4,845,718	
(b) Payments on death in service	102,638		81,829		184,467	
(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	228,511		165,185		393,696	
		3,061,910		2,361,971		5,423,881
(iii) Value of Future Benefits Payable in respect of 31,642 Female Contributors:						
(a) Retirement pensions	772,527		987,572		1,760,099	
(b) Payments on death in service	13,533		15,943		29,476	
(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	143,646		157,928		301,574	
		929,706		1,161,443		2,091,149
TOTAL LIABILITIES		5,921,527		4,499,581		10,421,108

**Stream to Interest 7.5%, Salary Inflation 6%, Escalation 4.5% - (1% less interest after retirement)
Contribution = EAN of 9.34% including CPP for employee matched by employer

PSSF AND SAF AND CRF APPROPRIATIONS COMBINED (AFTER REFORM) FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST** VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	accrued		unaccrued		total	
(i) Fund (estimated)			(i) Value of Benefits Granted and payable in respect of:						
(a) PSSF	3,912,657		(a) male pensioners	1,219,840		575,727		1,795,567	
(b) SAF	420,946		(b) female pensioners	343,301		154,415		497,716	
		4,333,603	(c) widowers	6,628		2,609		9,237	
(ii) Value of future contributions			(d) widows	224,689		105,086		329,775	
(a) male	1,088,314		(e) families of orphans	756		681		1,437	
(b) female	562,803		(f) male deferred annuitants	9,544		13,366		22,910	
		1,651,117	(g) female deferred annuitants	3,375		5,119		8,494	
(iii) Value of matching contributions by the Province of Ontario		1,651,117			1,808,133		857,003		2,665,136
(iv) Contributions receivable with respect to past services already credited		7,620	(ii) Value of Future Benefits Payable in respect of 44,968 Male Contributors:						
(v) PSSF & SAF Unfunded Liability			(a) Retirement pensions	2,441,196		1,881,435		4,322,631	
- accrued	1,575,639		(b) Payments on death in service	129,175		92,291		221,466	
- unaccrued	(18,343)		(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	278,321		207,422		485,743	
		1,557,296			2,848,692		2,181,148		5,029,840
(vi) CRF Unfunded Liability Under SABA		464,054	(iii) Value of Future Benefits Payable in respect of 31,642 Female Contributors:						
(vii) CRF Unfunded Liability For Supplement		42,077	(a) Retirement pensions	690,722		879,132		1,569,854	
			(b) Payments on death in service	23,788		25,896		49,684	
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	194,655		197,715		392,370	
					909,165		1,102,743		2,011,908
TOTAL ASSETS		9,706,884	TOTAL LIABILITIES		5,565,990		4,140,894		9,706,884

**Stream to Interest 7.5%, Salary Inflation 6%, Escalation 4.5%
Contribution = EAN of 9.07% including CPP for employee matched by employer

PSSF AND SAF AND CRF APPROPRIATIONS COMBINED (AFTER REFORM) FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST** VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985

(in thousands of dollars)

ASSETS			LIABILITIES	accrued		unaccrued		total	
(i) Fund (estimated)			(i) Value of Benefits Granted and payable in respect of:						
(a) PSSF	3,912,657		(a) male pensioners	1,301,666		655,051		1,956,717	
(b) SAF	420,946		(b) female pensioners	365,447		174,679		540,126	
		4,333,603	(c) widowers	7,007		2,934		9,941	
(ii) Value of future contributions			(d) widows	239,523		120,227		359,750	
(a) male	1,206,036		(e) families of orphans	775		730		1,505	
(b) female	625,730		(f) male deferred annuitants	11,124		16,540		27,664	
		1,831,766	(g) female deferred annuitants	4,369		6,006		10,375	
(iii) Value of matching contributions by the Province of Ontario		1,831,766			1,929,911		976,167		2,906,078
(iv) Contributions receivable with respect to past services already credited		7,620	(ii) Value of Future Benefits Payable in respect of 44,968 Male Contributors:						
(v) PSSF & SAF Unfunded Liability			(a) Retirement pensions	2,728,761		2,111,183		4,839,944	
- accrued	2,202,886		(b) Payments on death in service	144,601		103,280		247,881	
- unaccrued	7,942		(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	300,870		225,351		526,221	
		2,210,828			3,174,232		2,439,814		5,614,046
(vi) CRF Unfunded Liability Under SABA		500,558	(iii) Value of Future Benefits Payable in respect of 31,642 Female Contributors:						
(vii) CRF Unfunded Liability For Supplement		44,125	(a) Retirement pensions	772,481		987,575		1,760,056	
			(b) Payments on death in service	26,374		28,661		55,035	
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	209,627		215,424		425,051	
					1,008,482		1,231,660		2,240,142
TOTAL ASSETS		10,760,266	TOTAL LIABILITIES		6,112,625		4,647,641		10,760,266

**Stream to Interest 7.5%, Salary Inflation 6%, Escalation 4.5% - (1% less interest after retirement)
Contribution = EAN of 9.91% including CPP for employee matched by employer

TSF AND SAF AND CRF APPROPRIATIONS COMBINED (BEFORE REFORM) FOR POVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST** VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	accrued		unaccrued		total	
(i) Fund (estimated)			(i) Value of Benefits Granted and payable in respect of:						
(a) TSF	9,082,276		(a) male pensioners	1,092,967		520,156		1,613,123	
(b) SAF	1,031,767		(b) female pensioners	989,003		423,045		1,412,048	
		10,114,043	(c) widowers	53,726		19,167		72,893	
(ii) Value of future contributions			(d) widows	320,064		126,317		446,381	
(a) male	2,400,545		(e) families of orphans	1,068		1,163		2,231	
(b) female	2,621,855		(f) male deferred annuitants	35,655		19,465		55,120	
		5,022,400	(g) female deferred annuitants	80,935		44,830		125,765	
(iii) Value of matching contributions by the Province of Ontario		5,022,400			2,573,418		1,154,143		3,727,561
			(ii) Value of Future Benefits Payable in respect of 48,610 Male Contributors:						
			(a) Retirement pensions	5,633,810		4,313,687		9,947,497	
			(b) Payments on death in service	143,904		99,445		243,349	
(iv) TSF & SAF Unfunded Liability			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	142,254		79,629		221,883	
- accrued	3,177,054				5,919,968		4,492,761		10,412,729
- unaccrued	(695,106)		(iii) Value of Future Benefits Payable in respect of 63,451 Female Contributors:						
		2,481,948	(a) Retirement pensions	4,070,582		4,507,178		8,577,760	
(v) CRF Unfunded Liability Under SABA		832,397	(b) Payments on death in service	47,332		47,597		94,929	
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	312,103		250,158		562,261	
(vi) CRF Unfunnded Liability For Supplement		70,228			4,430,017		4,804,933		9,234,950
			(iv) Value of Benefits Payable in respect of Inactive Contributors		116,176				116,176
			(v) Provision for Future Administration Expense				52,000		52,000
TOTAL ASSETS		23,543,416	TOTAL LIABILITIES		13,039,579		10,503,837		23,543,416

**Stream to Interest 7.5%, Salary Inflation 6%, Escalation 4.5%
Contribution = EAN of 9.86% including CPP employee matched by employer

TSF AND SAF AND CRF APPROPRIATIONS COMBINED (BEFORE REFORM) FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST** VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	accrued		unaccrued		total	
(i) Fund (estimated)			(i) Value of Benefits Granted and payable in respect of:						
(a) TSF	9,082,276		(a) male pensioners	1,165,668		592,120		1,757,788	
(b) SAF	1,031,767		(b) female pensioners	1,049,283		476,707		1,525,990	
		10,114,043	(c) widowers	56,543		21,379		77,922	
(ii) Value of future contributions			(d) widows	338,400		141,957		480,357	
(a) male	2,672,342		(e) families of orphans	1,099		1,212		2,311	
(b) female	2,924,156		(f) male deferred annuitants	38,360		22,440		60,800	
		5,596,498	(g) female deferred annuitants	87,173		51,636		138,809	
(iii) Value of matching contributions by the Province of Ontario		5,596,498			2,736,526		1,307,451		4,043,977
			(ii) Value of Future Benefits Payable in respect of 48,610 Male Contributors:						
			(a) Retirement pensions	6,335,736		4,839,205		11,174,941	
			(b) Payments on death in service	161,883		113,024		274,907	
(iv) TSF & SAF Unfunded Liability			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	173,127		89,754		262,881	
- accrued	4,735,631				6,670,746		5,041,983		11,712,729
- unaccrued	(716,392)		(iii) Value of Future Benefits Payable in respect of 63,451 Female Contributors:						
		4,019,239	(a) Retirement pensions	4,578,751		5,053,817		9,632,568	
(v) CRF Unfunded Liability Under SABA		889,500	(b) Payments on death in service	52,017		53,013		105,030	
(vii) CRF Unfunnded Liability For Supplement		73,535	(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	351,042		275,791		626,833	
					4,981,810		5,382,621		10,364,431
			(iv) Value of Benefits Payable in respect of Inactive Contributors		116,176				116,176
			(v) Provision for Future Administration Expense				52,000		52,000
TOTAL ASSETS		26,289,313	TOTAL LIABILITIES		14,505,258		11,784,055		26,289,313

**Stream to Interest 7.5%, Salary Inflation 6%, Escalation 4.5% - (1% interest less after retirement)
Contribution = EAN of 10.87% including CPP employee matched by employer

TSF AND SAF AND CRF APPROPRIATIONS COMBINED (AFTER REFORM) FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST** VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	accrued	unaccrued	total
(i) Fund (estimated)			(i) Value of Benefits Granted and payable in respect of:			
(a) TSF	9,082,276		(a) male pensioners	1,092,967	520,156	1,613,123
(b) SAF	1,031,767		(b) female pensioners	989,003	423,045	1,412,048
		10,114,043	(c) widowers	53,726	19,167	72,893
(ii) Value of future contributions			(d) widows	320,064	126,317	446,381
(a) male	2,492,840		(e) families of orphans	1,068	1,163	2,231
(b) female	2,728,618		(f) male deferred annuitants	35,655	19,465	55,120
		5,221,458	(g) female deferred annuitants	80,935	44,830	125,765
(iii) Value of matching contributions by the Province of Ontario		5,221,458		2,573,418	1,154,143	3,727,561
			(ii) Value of Future Benefits Payable in respect of 48,610 Male Contributors:			
			(a) Retirement pensions	5,633,478	4,312,862	9,946,340
			(b) Payments on death in service	296,998	223,459	520,457
(iv) TSF & SAF Unfunded Liability			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	187,694	105,527	293,221
- accrued	3,560,744			6,118,170	4,641,848	10,760,018
- unaccrued	(788,180)		(iii) Value of Future Benefits Payable in respect of 63,451 Female Contributors:			
		2,772,564	(a) Retirement pensions	4,069,515	4,504,901	8,574,416
(v) CRF Unfunded Liability Under SABA		832,397	(b) Payments on death in service	115,997	127,104	243,101
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	429,993	328,883	758,876
(vi) CRF Unfunnded Liability For Supplement		70,228		4,615,505	4,960,888	9,576,393
			(iv) Value of Benefits Payable in respect of Inactive Contributors	116,176		116,176
			(v) Provision for Future Administration Expense		52,000	52,000
TOTAL ASSETS		24,232,148	TOTAL LIABILITIES	13,423,269	10,808,879	24,232,148

**Interest 7.5%, Salary Inflation 6%, Escalation 4.5%
Contribution = EAN of 10.24% including CPP employee matched by employer

TSF AND SAF AND CRF APPROPRIATIONS COMBINED (AFTER REFORM) FOR PROVIDING BASIC PENSION PLUS SUPPLEMENT PLUS ESCALATION UNDER SABA

STREAM INTEREST** VALUATION BALANCE SHEET AS AT DECEMBER 31, 1985
(in thousands of dollars)

ASSETS			LIABILITIES	accrued		unaccrued		total	
(i) Fund (estimated)			(i) Value of Benefits Granted and payable in respect of:						
(a) TSF	9,082,276		(a) male pensioners	1,165,668		592,120		1,757,788	
(b) SAF	1,031,767		(b) female pensioners	1,049,283		476,707		1,525,990	
		10,114,043	(c) widowers	56,543		21,379		77,922	
(ii) Value of future contributions			(d) widows	338,400		141,957		480,357	
(a) male	2,760,892		(e) families of orphans	1,099		1,212		2,311	
(b) female	3,027,169		(f) male deferred annuitants	38,360		22,440		60,800	
		5,788,061	(g) female deferred annuitants	87,173		51,636		138,809	
(iii) Value of matching contributions by the Province of Ontario		5,788,061			2,736,526		1,307,451		4,043,977
			(ii) Value of Future Benefits Payable in respect of 48,610 Male Contributors:						
			(a) Retirement pensions	6,285,982		4,817,811		11,103,793	
			(b) Payments on death in service	335,863		252,981		588,844	
(iv) TSF & SAF Unfunded Liability			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	200,232		114,024		314,256	
- accrued	5,038,697				6,822,077		5,184,816		12,006,893
- unaccrued	(809,691)		(iii) Value of Future Benefits Payable in respect of 63,451 Female Contributors:						
		4,229,006	(a) Retirement pensions	4,543,153		5,029,931		9,573,084	
(v) CRF Unfunded Liability Under SABA		889,500	(b) Payments on death in service	130,327		142,964		273,291	
			(c) Deferred annuities, transfer payments and refunds to those who will withdraw from service	460,065		356,720		816,785	
(vii) CRF Unfunnded Liability For Supplement		73,535			5,133,545		5,529,615		10,663,160
			(iv) Value of Benefits Payable in respect of Inactive Contributors		116,176				116,176
			(v) Provision for Future Administration Expense				52,000		52,000
TOTAL ASSETS		26,882,206	TOTAL LIABILITIES		14,808,324		12,073,882		26,882,206

**Stream to Interest 7.5%, Salary Inflation 6%, Escalation 4.5% - (1% less interest after retirement)
Contribution = EAN of 11.24% including CPP employee matched by employer